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Preferred and Alternate Routes: BPA 500-Kilovolt Line From Garrison-West

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PREFERRED AND ALTERNATE ROUTES FOR THE
BONNEVILLE POWER ADMINISTRATION'S 500-kV
TRANSMISSION LINE FROM GARRISON WEST

FINAL REPORT TO THE BOARD OF NATURAL RESOURCES AND CONSERVATION,
SUPPLEMENTING THE FEDERAL DRAFT ENVIRONMENTAL IMPACT STATEMENT
ON THE GARRISON-SPOKANE 500-kV TRANSMISSION PROJECT

April 1983

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
ENERGY DIVISION
32 S. Ewing
Helena, MT

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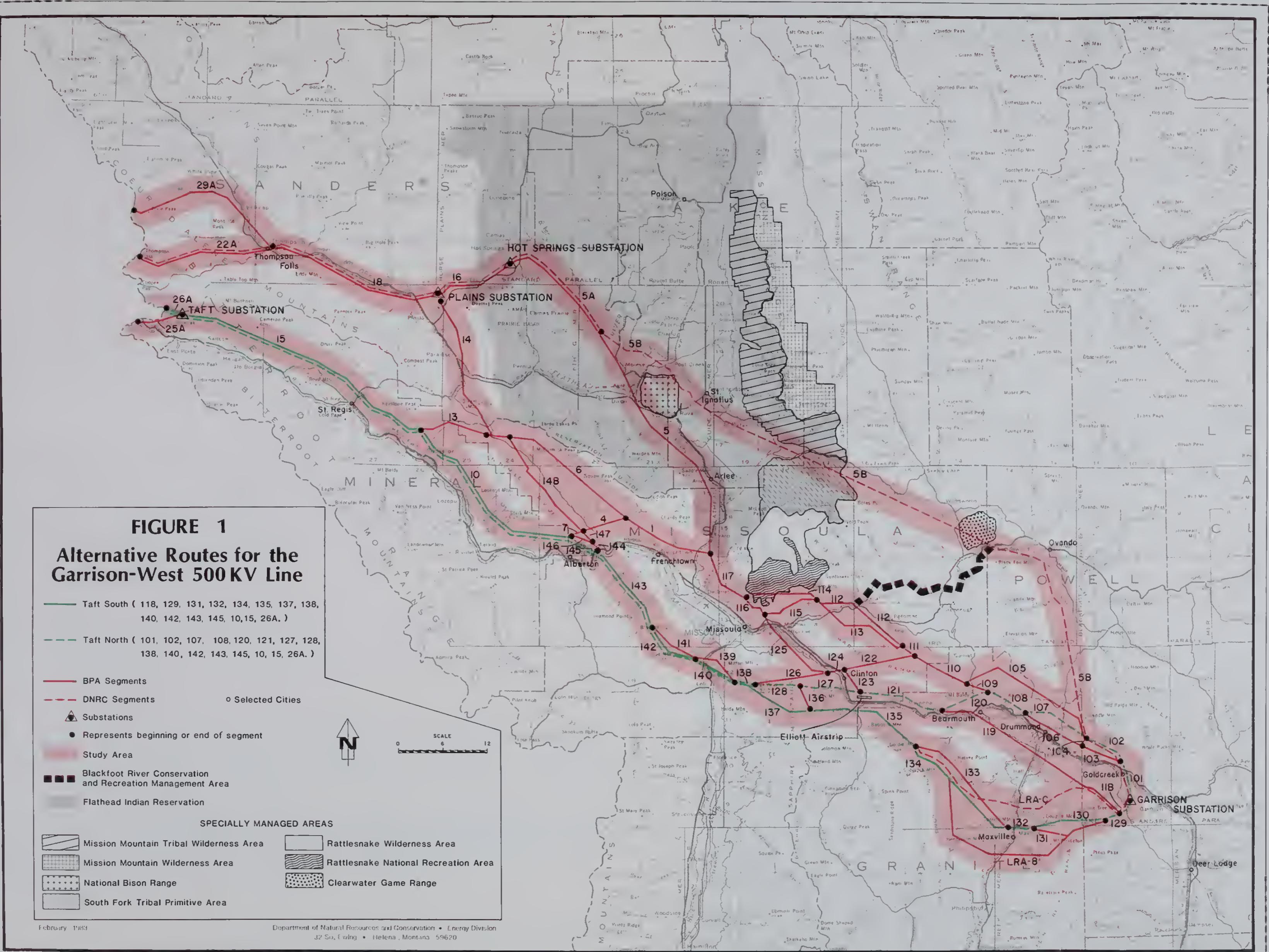


FIGURE 1

Alternative Routes for the Garrison-West 500 KV Line

— Taft South (118, 129, 131, 132, 134, 135, 137, 138,
140, 142, 143, 145, 10, 15, 26A,)

— ■ ■ ■ Taft North (101 102 103 107 108 120 121 127 128

BPA Segments

— DNRC Segm

Substations

● Represents

Study Area

and Recreation Management

Flathead Indian Reservation

SPECIALLY MANAGED AREAS

Mission Mountain Tribal Wilderness Area

Mission Mountain Wilderness Area

National Bisco Bisco

South Fork Tribal Primitive Area

Page 1 of 1

February 1983

Department of Natural Resources and Conservation • Energy Division
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SUMMARY

THE PROPOSED PROJECT

The Bonneville Power Administration (BPA) has proposed construction of a 500-kV transmission line from Garrison, Montana, to Bell, Washington, near Spokane. The line would carry power 430 miles from the generating complex at Colstrip to a substation near the Idaho border, and on to the Pacific Northwest. Construction of the powerline is scheduled to begin with right-of-way clearing in May 1983, and to conclude in late 1985 to meet the start-up date of Colstrip unit 4.

The route preferred by BPA and DNRC would connect to a substation that would be built near Taft, Montana, which is about 6.0 mi east of the Idaho border and 4.0 mi north of Interstate Highway 90. Other routes that were considered would connect either to an existing substation at Hot Springs or to a new substation that would be built near Plains.

HISTORY OF THE PROPOSED PROJECT

The construction of a 500-kV line for delivering power from Colstrip to the Pacific Northwest has a history extending back 10 years. Originally proposed as part of the Colstrip 3 and 4 projects in 1973, the line initially was to be built by MPC from Colstrip to a substation near Hot Springs, Montana, the eastern terminus of the Northwest's 500-kV system. In 1976 the Board of Natural Resources and Conservation approved the Colstrip project, including a route for the 500-kV line from Colstrip through Broadview, Townsend and Helena, to Hot Springs.

In 1977, MPC, citing difficulty in obtaining easements across the Flathead Reservation, asked BPA to build the line from Townsend west. BPA agreed, and issued an environmental impact statement (EIS) suggesting a different route than approved by the Board. Subsequent legal action culminated in a ruling that BPA must meet the "substantive standards" of Montana's Major Facility Siting Act. This ruling led the Department of Natural Resources and Conservation to issue this addendum to the BPA EIS, to address public concern and supplement information in the BPA document. A subsequent ruling indicated that Montana's Act did not have "substantive standards" with which BPA must comply; this ruling is being appealed.

SETTING OF THE PROPOSED PROJECT

Western Montana is mountainous with most agriculture and human habitation located in valley bottoms, and with much forested land managed by the U.S. Forest Service in the mountains. The Forest Service land is important for timber, wildlife, and recreation, and large portions of it have been set aside for management as wilderness or primitive areas that could not be crossed by transmission lines. The entire area is valued for its scenery, both by tourists and local residents.

SUMMARY OF PUBLIC COMMENT AND OPINION

The concerns of the residents regarding the proposed powerline were sought in a series of public hearings that BPA held in the vicinity of the various route alternatives. DNRC had representatives at all 14 meetings as observers, and held two additional meetings of its own, one in Ovando and one in Arlee. The range of expressed public concern is shown below.

Many people questioned BPA's conclusion that there would be no health effects and pointed out conflicts in the data. Specific concerns included: electrical shocks, fears for the safety of children playing near the line or towers, lightning hazards, human health hazards that might be caused by the line, health effects on livestock and consequent damage to breeding stock.

The proposed line was seen as an economic burden to the counties, because no taxes would be paid on the federally-owned facilities. Because BPA does not make payments in lieu of taxes, numerous people advocated the use of impact aid payments from the agency to the counties to defray expenses caused by the project, such as increased road maintenance costs or fire and police protection.

Many residents suggested that public projects belong on public land away from people and houses. Landowners were concerned that the proximity of the powerline could lower property values and restrict further residential development in populated areas. Potential loss of timber-producing land was raised as an issue, and forest managers and landowners want location of powerline access roads to be coordinated with timber management needs. Agricultural concerns included the removal of land from production by tower bases and access roads, inconveniences to farming operations, and interference with mechanical irrigation.

Enjoyment of the land as a way of life was said to be one reason people opposed the powerline. Many noted that they had chosen to live in western Montana because of its scenic qualities and that a transmission line would detract from the natural beauty and reduce the quality of life. Many raised the possibility of decreased recreational quality at recreational sites. Particular concern was expressed for the Rattlesnake National Recreation Area.

Residents said they were worried about possible affects on big game, protected species, and gamefish. Loss of important big game habitat was an issue, as was increased hunter access to wildlife by means of access roads. Increased runoff, erosion, and stream sedimentation associated with construction of the transmission line and access roads was identified as a concern. Potential herbicide pollution of water resources was seen as a problem.

ENVIRONMENTAL IMPACTS

DNRC's analysis of the potential effects of the proposed transmission line is intended to supplement and correct BPA information, and to address concerns expressed by Montanans.

BPA's first, second, and third choice routes are called the Taft, Plains, and Hot Springs routes after the existing or proposed substations to which they would convey electricity (Figure 1). DNRC's preferred route is the Taft South Route. The impacts summarized below would occur to varying degrees for all the routes.

Socioeconomic Effects

There would be a small short-term increase in population during construction of the transmission line, which could cause increased spending by local governments. Construction of the transmission line would cause short-term impacts from dust, noise, and interference with agriculture, and some minor strain on public and private services.

Economic benefits during construction would be short-term. There would be about 135 short-term jobs for Montanans, but no long-term employment. There also would be short-term income benefits for businesses selling goods and services to construction contractors and workers. BPA would have no Montana tax liability, so taxing jurisdictions crossed by the line would receive no increase in their tax base.

Long-term impacts of the project would be more important. These would include visual deterioration of the landscape, additional agricultural impacts such as interference with irrigation practices, increased electrical hazard risk, and unknown effects to land values. Many residents opposed to the line would experience frustration and resentment.

Electrical Fields and Health Effects

Electrical fields produced by 500-kV transmission lines have not been demonstrated to affect the health of humans or animals, but some minor biological effects of unknown consequence have been demonstrated in test animals exposed to electrical fields comparable in strength to those that would exist under the proposed powerlines.

Other impacts that could be caused by electrical fields surrounding the line include noise during wet weather, radio and television interference, and electric shocks. Most of these impacts could be avoided through adherence to BPA's engineering practices and construction manual.

Wildlife & Aquatic Habitat

There would be a reduction in the quality of big game security habitat due to the construction and maintenance of access roads, and without road control hunters could reach previously less accessible areas, increasing short-term harvests and reducing long-term hunting quality. Construction of access roads could cause sedimentation and degrade water quality and spawning habitat in small mountain streams.

Cultural Resources

Approximately 300 archaeological and historical sites are located in the various routes. Many other unknown sites are believed to exist there. Construction of the powerline could destroy or damage some sites. New or improved access roads could lead to increased vandalism of sites or theft of artifacts. The scenic character of some types of sites, such as buffalo jumps or rock art, could be disrupted by the visual intrusion of the line.

Land Use

A strip of land at least 125 ft wide from Garrison to the Idaho border would be committed to the transmission line, eliminating many other possible uses. The transmission line would cross some privately-owned land, which would require easements from the landowners. One to four miles of access roads would be built for each mile of transmission line. Most of the impacts caused by soil disturbance would result from these roads.

Recreation and Aesthetics

The transmission towers, right-of-way clearing, and access roads would disrupt scenic quality along most of the line. The visual intrusion would cause serious impacts in the western Montana landscape, especially in residential areas and recreation settings where concern for scenic quality is high.

Construction Costs

The proposed project would cost \$200,872,000 if the Hot Springs Route were used, \$212,000,000 for the Plains Route, or \$222,125,000 for the Taft Route. Two-thirds of the total costs would be for the portion of the line in Montana. The Taft and Plains routes are more expensive because both would require construction of a new substation, more new access roads, and more steel for towers. The steep terrain on these routes also raises costs. There has been no calculation of the cost of reducing impacts along any of the routes, so cost totals would be higher.

PROPOSED ROUTES

DNRC began its study with the hope that it could find a route that would have less impact and be more acceptable to Montanans than BPA's proposed routes. After reviewing BPA's draft EIS in October 1982, DNRC began collecting information and performing analyses to evaluate these routes. Additional information was necessary because BPA's draft EIS did not provide the information necessary to choose an environmentally preferred route according to the requirements of the Montana Major Facility Siting Act.

DNRC mapped environmental features at a more detailed scale than BPA, and gathered additional data to make the environmental analysis more complete. DNRC also evaluated a route over Jocko Pass, which was the route approved by the Board as part of the Colstrip 3 and 4 project.

ROUTE RECOMMENDATION

After research and analysis were complete, representatives of DNRC and BPA met to compare evaluations of routes for the transmission line. The meeting resulted in a joint siting recommendation for the Montana portion of the Garrison-Bell 500-kV transmission system. The recommended route is called the Taft South Route, because it would pass through a new substation at Taft, near the Idaho border (Figure 1). The "south" in the Taft South Route is used to avoid confusion with the Taft North Route, which takes a more northerly path from Garrison to Miller Creek.

Given the high level of public interest demonstrated at hearings on the project, DNRC agreed with BPA that the line should avoid inhabited areas as much as possible. Table 11 shows the comparisons of the Taft South Route with several other less favorable routes examined by DNRC and BPA.

Although DNRC agreed with BPA that the route selected presented the best opportunity to avoid or reduce impacts, DNRC pointed out that the impacts actually experienced would depend upon the exact location of the line within the 4-mile-wide corridor that was studied. DNRC requested BPA to allow DNRC participation in selecting the location of the line within the corridor. It was hoped that this would allow the best opportunity to avoid sensitive areas, such as residences and irrigated farmland. There is high public concern about the line in the small community of Maxville, south of Drummond, and DNRC hopes to ensure the line is located to avoid impacts there as much as possible.

The Taft South Route would affect fewer people and fewer homes than the other routes examined, but the potential for adverse impacts to natural systems is high. DNRC and BPA recommend numerous measures to reduce or avoid impacts, but no amount of such effort can eliminate all such effects.

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Federal Aviation Administration
Montana Department of Fish, Wildlife and Parks
Montana Wildlife Federation
Rock Creek Protective Association
Trout Unlimited
Washington Water Power

CHAPTER ONE - PROJECT UPDATE

On March 10 and 11, 1983, the Board of Natural Resources and Conservation held public hearings in Missoula to gather testimony on the Bonneville Power Administration (BPA) proposed 500 kilovolt (kV) transmission line from Garrison to the Idaho border. This chapter presents additional information and findings on subjects raised during the Board's hearing.

New information presented addresses three general topics: (1) obstacles to siting the transmission line, including the uncertain status of the Forest Service Roadless Area Review and Evaluation (RARE II) areas, and aviation hazards; (2) social concerns including the use of private land, loss of tax base, and payments-in-lieu-of taxes; and (3) technical and policy issues including the possibility of locating the line underground at critical points, Forest Service road policy, the applicability of the Board's policy favoring parallel installation of linear facilities, and DNRC's comparison of the Taft North and Taft South routes.

In May, the Board will decide whether BPA's proposal is in compliance with the Siting Act, and will issue a decision on the best route, based on all the information available to it.

CONSTRUCTION SCHEDULE

Anticipated 1983 Clearing Activities

BPA hopes to let contracts for clearing and access road construction in the spring of 1983. There would be a separate contract for each of four segments from the Garrison substation to the proposed Taft substation for this phase of the construction. The first segment would go from the Garrison substation to a point near Rock Creek, which is about 46 miles. The second would go from near Rock Creek to a point 3 miles north of Alberton, a distance of 49 miles. The third would go from there to a point east of the Clark Fork at St. Regis, 33 miles. The fourth would continue to the Taft substation near the Montana-Idaho border.

Tower construction would begin in spring 1984 and BPA anticipates that the line would be completed for energization in the fall of 1985. BPA expects to decide on the number of segments for this construction phase in May, 1983. There could be anywhere from two segments of 80 miles each to four of 40 miles each.

Any delay in the start of construction increases the likelihood of delay in the energization date. The construction schedule cannot be defined well until the route is chosen and the right-of-way acquired.

DNRC analysis indicates that a delay of up to five months in the construction schedule would cause no increased costs. After that, estimated cost increases would be \$5 million a month in March, April, and May, 1986, \$6.7 million in June, \$10.3 million in July, and \$22.9 million in August, and fluctuating thereafter. The costs would fall partially on California ratepayers as a result of having to pay the higher rates that would result from running oil-fired generators rather than purchasing the cheaper Colstrip power, and partially on ratepayers in the Northwest, including Montana. The costs to the northwest ratepayers are estimated at about half the figures cited above for California ratepayers, but this could vary if any state's public service commission required the utilities to absorb part of the cost in that state.

ROCK CREEK UPDATE

Since the publication of DNRC's draft EIS, there has been a concerted effort to find a better way to cross Rock Creek with the proposed 500-kV transmission line. Originally, BPA proposed a high span across the canyon to avoid impacts to the creek, which is a nationally-acclaimed Blue Ribbon trout stream. The Aeronautics Division of the Montana Department of Commerce, however, said that the high span would pose an extreme hazard to aircraft flying the canyon. According to the Division of Aeronautics, Rock Creek is a commonly-used air corridor, especially when Hellgate Canyon is blocked by low clouds and fog. Elliott airfield, an emergency and recreational landing strip, is located near the mouth of Rock Creek.

Rock Creek is a special recreation resource to Montanans and out-of-state visitors alike. One of the original Blue Ribbon trout streams (and the only one west of the Continental Divide in Montana), it is now designated a Class I (highest value) fishery by DFWP. For the past two decades, DFWP and citizens of western Montana have been actively working to preserve the stream's quality fishing. Rock Creek also is one of the six rivers in the Montana Recreational Waterway System. The management goals for the Valley of the Moon, a former ranch now managed by the Forest Service (see Figure 2) are designed to preserve the natural setting and opportunities for dispersed recreation, mainly fishing. The Valley of the Moon ranch site is a historic resource eligible for listing on the National Register of Historic Places.

This section summarizes the efforts to find a crossing that would minimize environmental impacts while permitting safe air travel. The primary alternatives are described, as are the views of concerned groups and agencies. BPA is currently developing photo simulations of several of the more feasible alternatives.

Alternative Crossings

Eight routes across Rock Creek were identified and studied by the Forest Service BPA, DNRC, and the Aeronautics Division (see Figure 2). The Rock Creek Protective Association (RCPA), a group of about 146 landowners, also was involved, as were other Rock Creek residents who do not belong to the RCPA.

Original crossing, high span. As shown in Figure 3, the initial crossing proposed by BPA was a 4,800-foot-long span from rim to rim. The upper conductor would be 660 feet above the canyon floor, which Aeronautics said would pose an unacceptable risk to aircraft flying on visual flight rules (VFR). From Rock Creek Road, several towers on the east side of the creek would be visible when traveling north. From the Valley of the Moon recreation area, one tower on the east side would be in sight. Travelers on I-90 would be able to see about 1 mile of the towers and right-of-way on the western slope.

On this and all other overhead crossings, marker balls would be necessary to enable pilots to see the line. Marker balls are typically placed on the static wires, but at Rock Creek these would be eliminated to reduce height above ground. The final specifications for the marker balls have not been developed, but they would be as large as the conductors could support (up to the 54 inch size recommended by Aeronautics). The markers would likely be alternating red, yellow, and white, and could be strung on some or all of the conductors. In any case, the markers would be visually prominent.

About six miles of access roads would be required, nearly all of which would be incompatible with Forest Service management objectives. However, the road system probably would not result in greatly increased sedimentation because the slopes crossed are not excessively steep and there would be a large buffer zone between the roads and the creek. This route was initially acceptable to RCPA and the Forest Service.

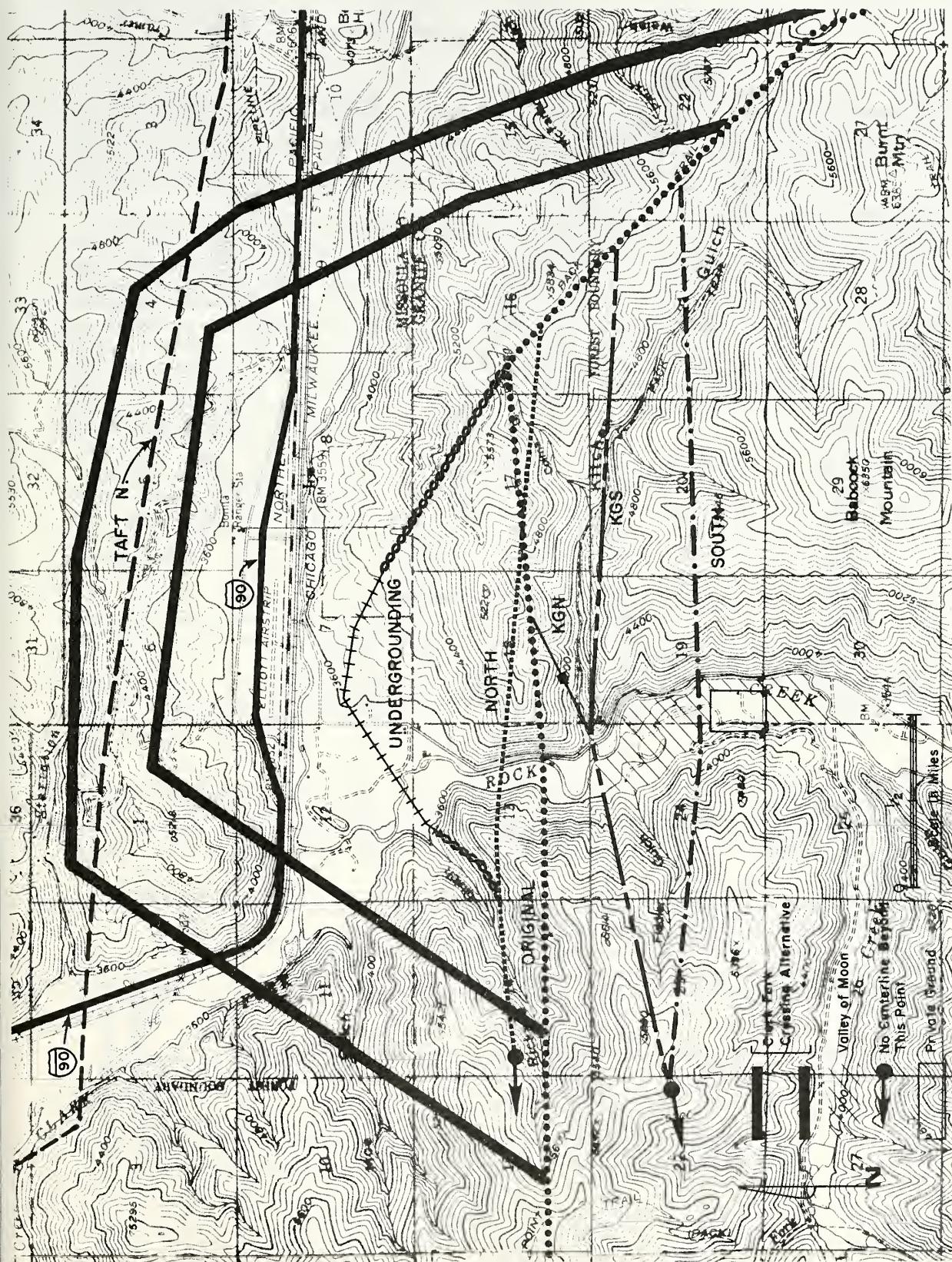
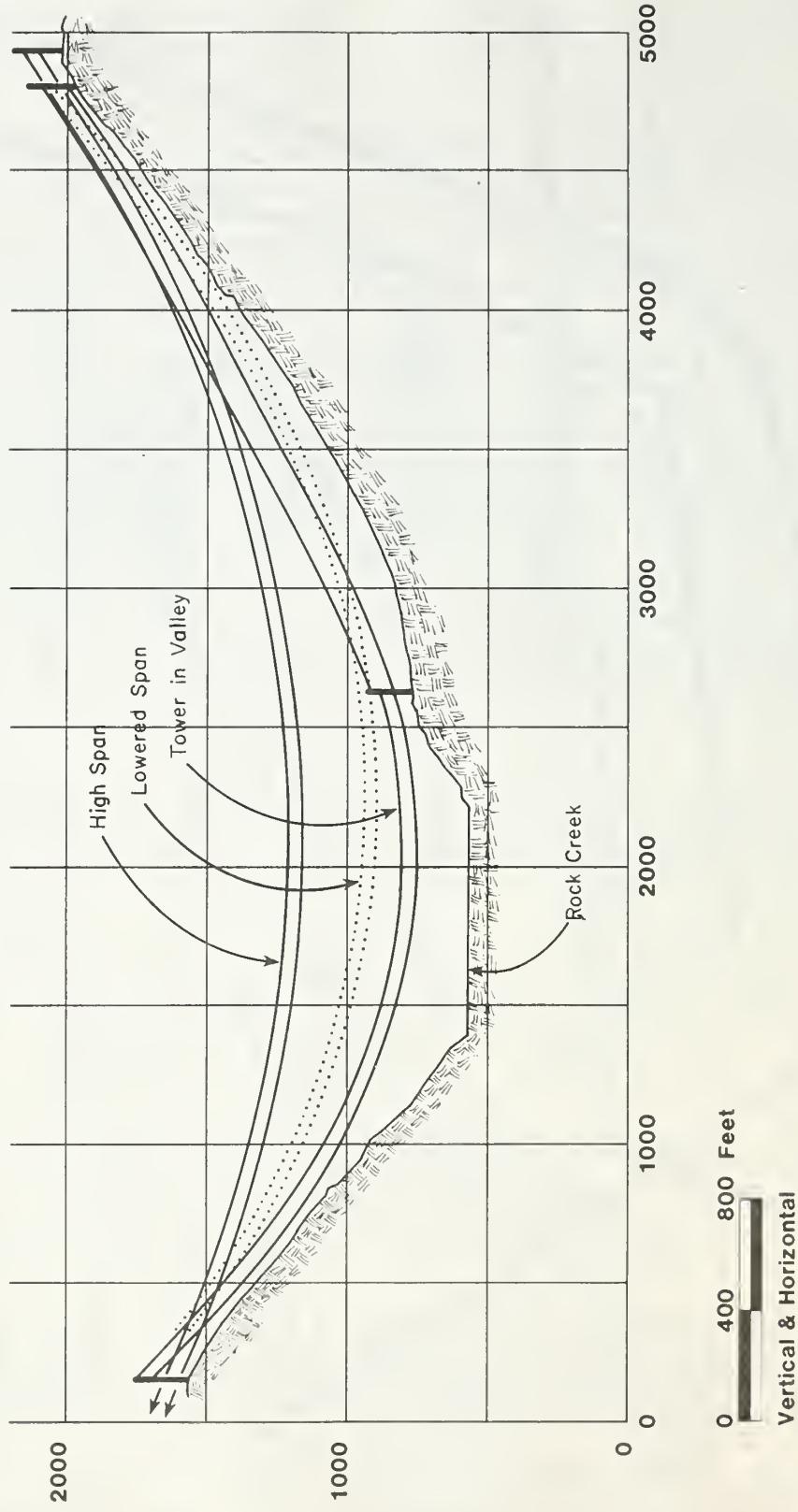


FIGURE 2. ALTERNATIVE ROCK CREEK CROSSINGS

FIGURE 3. PROFILE OF ROCK CREEK CROSSINGS
PROPOSED BY BPA ON ORIGINAL
ALIGNMENT



Original crossing, lowered span. In this configuration, the towers on either side of the canyon rim would be brought down the slope. The upper conductor would be 450 feet at its highest point above the ground (see Figure 3). The visual and other impacts would be similar to the high span, but access roads would be required down steep slopes to the slightly lowered towers. This lower alternative was still judged by Aeronautics to be an unacceptable hazard to aircraft.

Original crossing, tower in valley. Although still on the initial alignment across Rock Creek, this alternative would lower the height of the upper conductor to 335 feet at its highest point above the canyon floor (see Figure 3). This would be accomplished by placing a tower at the foot of the western slope, which would greatly increase visual impacts to the Valley of the Moon area. An additional environmental disadvantage would be the impacts of an access road to this tower site. If access were from the bottom, an existing road would have to be upgraded substantially, as would two bridges over the creek. If the tower were reached from the canyon rim, the new road would cut across the hillside in plain view of the Valley of the Moon area. The Forest Service, DFWP, and RCPA are all opposed to this alternative because of the substantial impacts to the area's scenic qualities. The Aeronautics Division has stated that this route would be conditionally acceptable, although still remaining a hazard to aviation (MDOC 1983).

Kitchen Gulch north and south. Located south of the original alignment, these options would require placing a tower near the mouth of Kitchen Gulch, where it would be hidden from most viewpoints in the valley (Figure 2). The crossing would be closer to Valley of the Moon, however, increasing visual impacts to anglers and other recreation visitors. The tower also would be located on private land very close to a trailer lot (now vacant, but with hookups still in place).

An additional problem is that the steep slopes of Kitchen Gulch would have to be crossed, posing a sedimentation risk to the creek. Kitchen Gulch supports trout spawning and has a low sediment flushing capability because its flows are seasonally moderated by subsurface flowage. Access roads cutting close to riparian areas on the south side of Kitchen Gulch would increase risk of sedimentation, especially during low flow periods. Erosion is evident at the site, and insufficient vegetation is present to impede or filter sediment movement. These routes are opposed by all involved except Aeronautics; the conductors would be low enough to acceptably reduce hazards to aircraft.

Southern Route. This route also lowers the conductors enough to reduce risk to pilots. However, it crosses directly over and bisects the Valley of the Moon, where it would be visually devastating to recreation users. This alignment is therefore unacceptable to the Forest Service, DFWP, and RCPA. This option also involves a tower very low on the west side of the valley.

Northern Route. This is one of the two most recently suggested alignments. Located about 1,300 feet north of the original crossing, this route would span the canyon for 3,400 feet. The height of the upper conductor at its highest point above the ground, however, would be 299 feet, slightly lower than with the tower in the valley option acceptable to Aeronautics (see Figure 4). This is possible in part because the western slope is steeper, permitting a lower sag without coming too close to the hillside. The lowered sag also would require very tall towers; 275 feet on the east side and 250 feet on the west.

From the Valley of the Moon area, it may not be possible to see any towers on the eastern side of the creek, but two towers on the west probably would be skylined. The viewing distance, however, would be greater than for the original high span. The towers and right-of-way on the west side would be slightly more hidden from viewers on I-90, but more towers on the east side would be visible. No access roads would be required in the Rock Creek drainage.

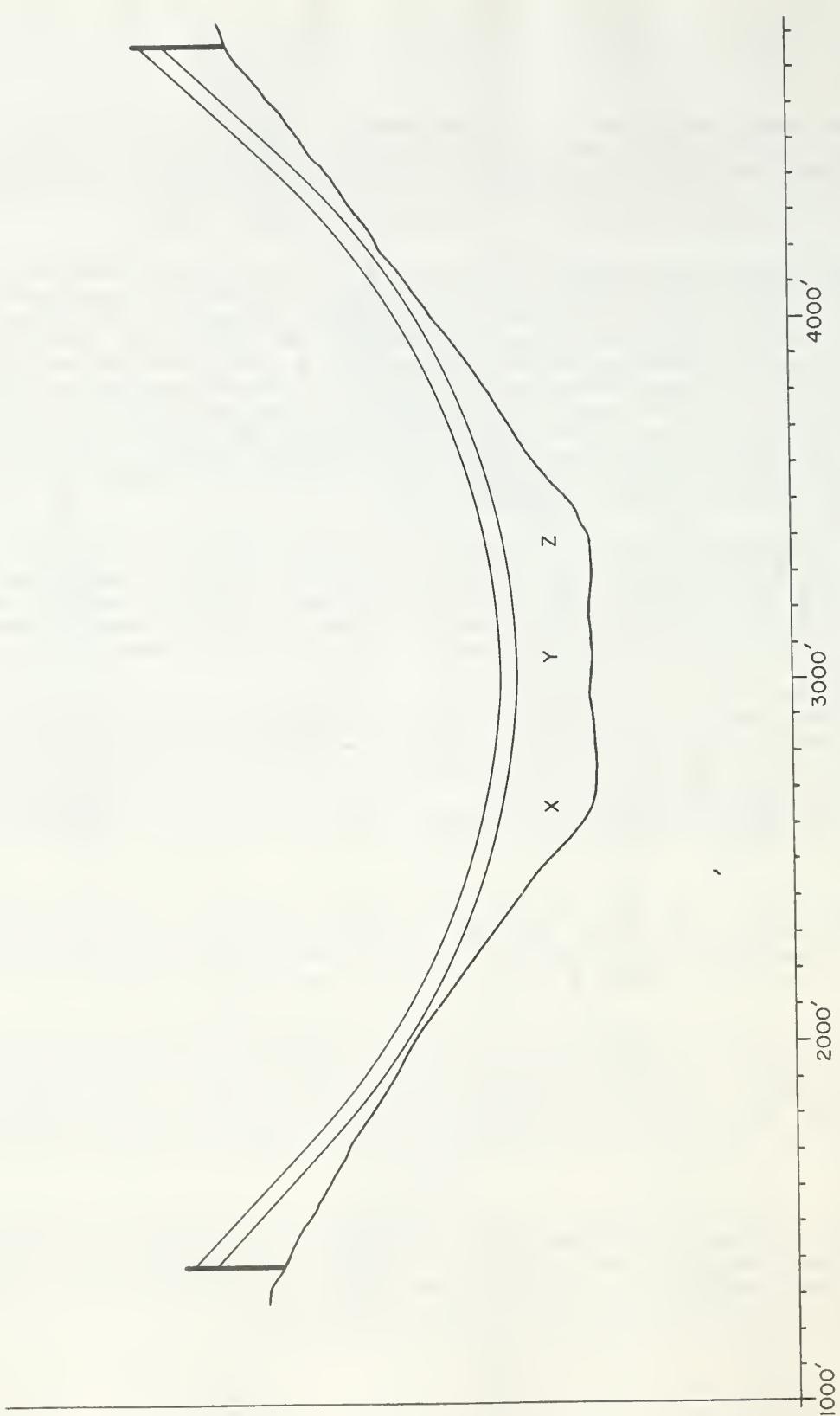


FIGURE 4. PROFILE OF ROCK CREEK CROSSING
ON NORTHERN ALIGNMENT

A disadvantage of this route is its closer proximity to several houses on private land north of the alignment, including the Ekstrom resort. Although trees would screen the line from many private areas, the conductors would be about 1,400 feet from the nearest house, as opposed to 2,500 feet along the original route. At the campground area behind Ekstrom's, little screening is available, and the line's proximity would create adverse visual impacts.

The Forest Service, BPA, DNRC, Aeronautics, RCPA, and other landowners met at Rock Creek on April 4 to discuss this suggested new alignment. This was the third meeting held at Rock Creek in the attempt to find a mutually acceptable route. The local residents did not see this new option as an improvement upon the other alternatives, and it was also undesirable to DFWP which does not want the line to cross Rock Creek at all. The option did receive favorable comment from the Forest Service, and Aeronautics indicated that the crossing would be conditionally acceptable, although still presenting some risk to aircraft.

Underground route. At its public hearing in Missoula March 11, 1983, the Board of Natural Resources and Conservation asked DNRC to study the potential for an underground crossing of Rock Creek. The results of this study are reviewed in the "Underground Transmission Options" section of this chapter, which demonstrates that while undergrounding reduces some types of impacts, it increases others. For example, placing portions of the line underground would greatly reduce visual impacts in the Rock Creek drainage, but would increase impacts to I-90 travelers, because of the overhead lines that would descend from the ridgeline to an underground terminal in clear view of the highway. It would be difficult to construct the overhead access lines to the eastern and western terminals across the steep, unroaded slopes above. The cost of this option also would be much greater (8.4 million).

The suggested underground route also was discussed at the April 4 meeting. Little reaction from the people or agencies present was evident, perhaps because this was the first time the idea had been proposed. The underground route has not been subjected to an engineering analysis, so some of the details of construction and location are uncertain. Concern was expressed over the proposed underground crossing of Rock Creek, and over the potential for oil spills or leaks from the cables or pipelines. This route is marginally acceptable to DFWP, but is unacceptable to the RCPA (Hammer 1983).

Public Comment

Rock Creek generated more public comment than any other resource located along any of the routes. DNRC received 15 letters from individuals, and petitions signed by 242 people. The petition opposed any crossing that would either create an aeronautical hazard or would involve construction of towers in the valley floor. In addition, letters were received from the Montana Chapter of the American Fisheries Society, Trout Unlimited, the Rock Creek Protective Association, the Spokane Fly Fishers, and the Inland Empire Fishing Club. These groups were concerned not only with impacts to the fishery, but with impacts resulting from the visual intrusion of the line.

The Missoula City Council passed a resolution opposing the crossing of Rock Creek, based on impacts to recreation and aesthetics, air travel, wildlife, and health and safety. In addition, the RCPA, in a letter to DNRC dated April 8, said it was "in the process of seeking an injunction to stop the construction and to have an investigation of the BPA" (Hammer 1983).

Other Possibilities

Given this complex situation, it is prudent to look for other possible solutions. The Taft North route, for example, would keep the line out of Rock Creek. Another yet-unstudied possibility may be to cross over the Clark Fork east of Rock Creek and then cross back west of the creek, either by locating the line underground just south of Clinton, or by spanning the Clark Fork between Clinton and Rock Creek if a suitable location can be found. An approximate route for this alternative is labelled "Clark Fork crossing" on Figure 2.

Another possibility would be to follow the Taft South route, pick an overhead crossing at Rock Creek with the knowledge that important environmental values would be adversely affected, and find a way to compensate for those losses. For example, recreation sites could be purchased farther up Rock Creek on other nearby streams, or fishing quality in the stream could be improved. However, BPA has said it does not favor compensation where actual payment would be required, so this possible solution might be difficult to implement.

Conclusion

It is clear that there is no agreement on which crossing of Rock Creek would be the most desirable. DFWP is opposed to any overhead crossing, but remains open to considering the underground route. The local residents do not want to see Rock Creek disrupted by the transmission line. The Forest Service is opposed to any route involving towers in the valley or direct, substantial visual impacts to the Valley of the Moon. Aeronautics is opposed to options that do not involve a tower in the valley, with the possible exception of the Northern route.

From a resource perspective, the original high span was probably the least-impact alternative, but it would also create the greatest hazard to aircraft. If the routes that are unacceptable to either Aeronautics or the Forest Service are omitted, only the Northern route and the underground route remain. As noted above, the former is not desired by DFWP or the local residents. All of the options would affect Rock Creek visitors, about 95 percent of whom enter the drainage from the north. For many, the transmission line would be their first impression of Rock Creek.

The underground route would have its own set of adverse impacts, and BPA probably would be reluctant to incur the costs and engineering difficulties associated with an underground route. Any state recommendation to place the line underground at Rock Creek may not be followed (see Frick 1983 for a discussion of undergrounding). DNRC believes that the Clark Fork crossing alternative should be studied in more detail before a decision is made.

MAXVILLE UPDATE

When DNRC and BPA jointly recommended the Taft South route, they recognized that crossing the Maxville area would cause high social impact. Since adoption of the joint recommendation, both DNRC and BPA have intensively studied possible centerline adjustments in the Maxville area in an attempt to reduce impacts. The efforts included detailed field investigations and two public meetings with local residents. It became obvious that no solution would satisfy all parties. No matter which route is selected, someone will be dissatisfied.

The Granite County Alliance (GCA) is a group of citizens and landowners organized for the purpose of influencing the location of the line in the upper Clark Fork valley, particularly near Maxville. Members of this group testified at meetings and hearings held by BPA and DNRC, and sent many letters and petitions to both agencies and to the Board of Natural Resources and Conservation and to the congressional delegation.

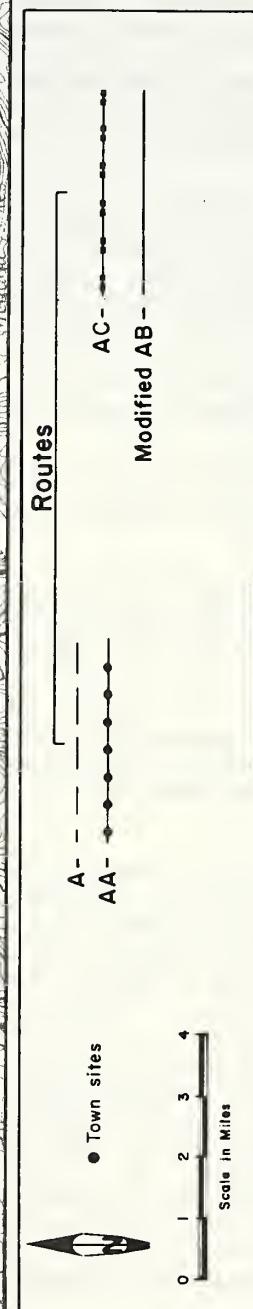
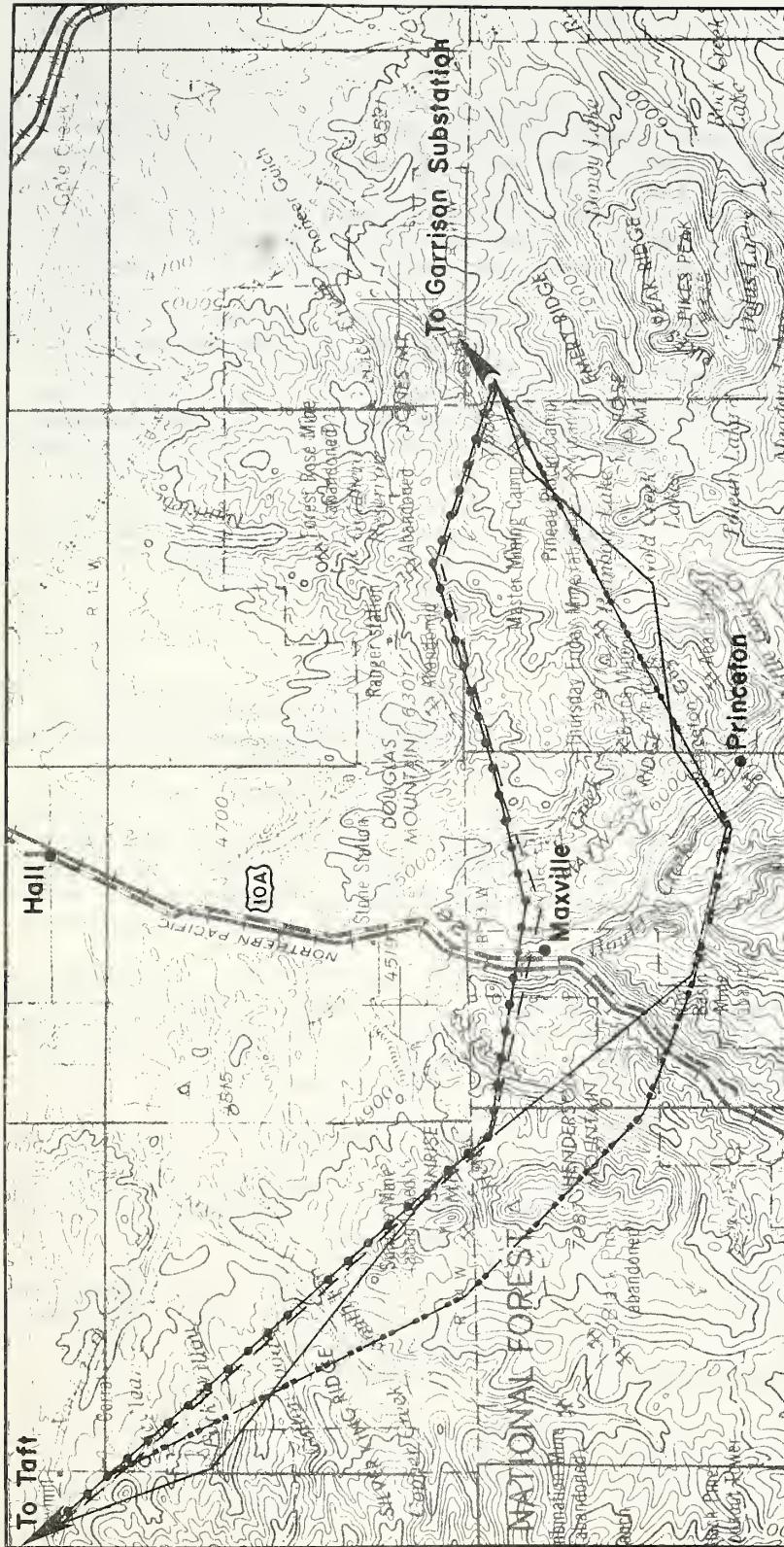


FIGURE 5. THE AC, AA, A, AND AB' PROPOSED SEGMENTS NEAR MAXVILLE

GCA members and other residents of the Maxville and Boulder Creek areas participated in the public meetings to identify an acceptable centerline through Maxville. The AB' route recommended by GCA represents a substantial compromise from alignment E which the group originally proposed. When it seemed unlikely BPA and DNRC would support E or AC, GCA members worked with community residents to find a shorter route that would be more acceptable to the agencies and still avoid homes to the greatest extent possible. AB' is the route GCA recommended to the Board at its March hearing. GCA remains solidly behind the AB' route.

Ten possible centerlines were considered, ranging from AA north of Maxville, to corridor E, the southernmost alternative. Alignments E, AC, and AB' were proposed by local residents. The other options were identified as possible locations by BPA or the Forest Service.

Following public meetings and further analyses by DNRC and BPA, six of the ten centerlines were dropped. A seventh, AC, was dropped when GCA proposed AB' as a compromise between AC and the AA and A alignments (see Figure 5).

Comparison of AB', AA, and A Routes

The following comparison describes the differences among routes AB', AA, and A.

Route AB': Impacts to People

The routing criteria GCA used to select this alignment include (1) staying off private land, (2) avoiding residences, and (3) putting the line on public land (Tavenner 1983). GCA did not consider impacts to the natural environment such as wildlife losses, erosion and sedimentation resulting from construction on steep slopes, or impacts to historical sites (Tavenner 1983).

Table 1 shows that AB' avoids all permanent residences by at least 1/2 mile. Two permanent and 10 seasonal residences would be within 1 mile of the line. The remainder (40 homes) would be within the relatively low-impact 1-2 mile zone. This zone includes homes in the Maxville townsite, most of which would be effectively screened from views of the line by mountains and trees (see Figure 6).

Table 2 shows that AB' crosses approximately 2-3 miles less private land, primarily rangeland, than A or AA. Rancher concerns focus on increased maintenance and trespass problems resulting from construction of new gates and roads to access tower sites. The gates and roads issue is important to ranchers, but impacts are much less severe than if the line were routed across intensive cropland. The routes are nearly equal in the amount of residential land crossed.

Persons who would be most affected by the AB' alignment are the residents and landowners of Boulder Creek, where there are five permanent and four seasonal residences. The two closest to the line would sustain major scenic impairment from nearby location of the line. From the Princeton area, occupants of one permanent and 7 or 8 seasonal residences would probably see a short segment of the line, particularly where it crosses the south side of Boulder Creek.

The AB' route would cross an area which the operators of a dude ranch east of Maxville expect to use for guided horseback rides. It would cross more semiprimitive backcountry suitable for dispersed recreation than the AA or A routes. The visual intrusion of the line in the Finley Basin area would be readily apparent to travelers on Boulder Creek Road.

Other adverse impacts of the AB' route are discussed below.

Route AA: Impacts to People

Route AA is a variation of BPA's original Taft South alignment, Route A, which is farther from Maxville and reduces the visibility of the line from the main portion of the Maxville community.

DNRC used the same routing criteria in evaluating possible centerlines through the Maxville area as it did for the transmission line project as a whole (see DNRC draft EIS, pp. 10-14). Impacts to people were given the highest weight, although impacts to the natural and cultural environment were also evaluated.

Table 1 shows that six homes would be within 1/2 mile of the transmission line. Included in this number are four homes very near where the line would cross Flint Creek and Highway 10A. One owner-occupied and one rental unit are actually within the currently proposed right-of-way. The other two homes, both of which are rentals, are within 600 feet of the proposed centerline (see Figure 7).

Twenty additional homes are located within one mile of alignment AA. Most of these homes are located near the center of Maxville; residents would have limited views of about a half-mile segment of line from a distance of about 3/4 mile.

Persons residing in the four homes at the Flint Creek-Highway 10A crossing would experience very high visual impact. Occupants of the two homes within the right-of-way could be displaced by the line.

BPA has suggested that social impacts of the AA route could be reduced if it were to buy out or otherwise compensate the owners of the four homes near the AA centerline. Voluntary home purchases appear possible for two of these homes which are rented and for sale, and for one of the other units that is occupied by its owner who has indicated he may be willing to sell.

BPA land acquisition personnel said the owner of the fourth home is adamantly opposed to selling or having the transmission line cross her property. Of the four homes at the crossing, this one is farthest from the centerline (600 feet). However, if this home were to remain, its occupants would experience high visual impact.

For homes in the right-of-way, impacts would be mitigated if the owners felt they were fairly compensated for their property. For homes outside the right-of-way, voluntary sales to BPA would effectively mitigate impacts. However, if the owners are not willing to sell, or if BPA is not able to purchase property outside the right-of-way, the social impacts would be severe because of the proximity of the line to these homes. BPA says it is uncertain of its legal authority to buy out or otherwise compensate landowners outside of the right-of-way, so the buy-out option may apply only to the two houses in the right-of-way.

The two homes in the 1/4 - 1/2 mile zone include a house in the north end of the Maxville townsite which would have a limited view of the line, and a year-round rental cabin at the west end of the AA option near the AA-AB intersection that is affected by all routes. It is in the 1/2 - 1 mile zone on AB'. The 20 residences in the 1/2 - 1 mile zone of the AA route include homes in the Maxville townsite and farther to the north. Some could not see the line; most would have a limited view.

AA and A would cross the access road to the dude ranch east of Maxville, and would likely be visible from the guest lodge.

AA and A would be less visible to travelers on Highway 10A than AB' because the alignments take advantage of topography and vegetative screening at the highway crossing.

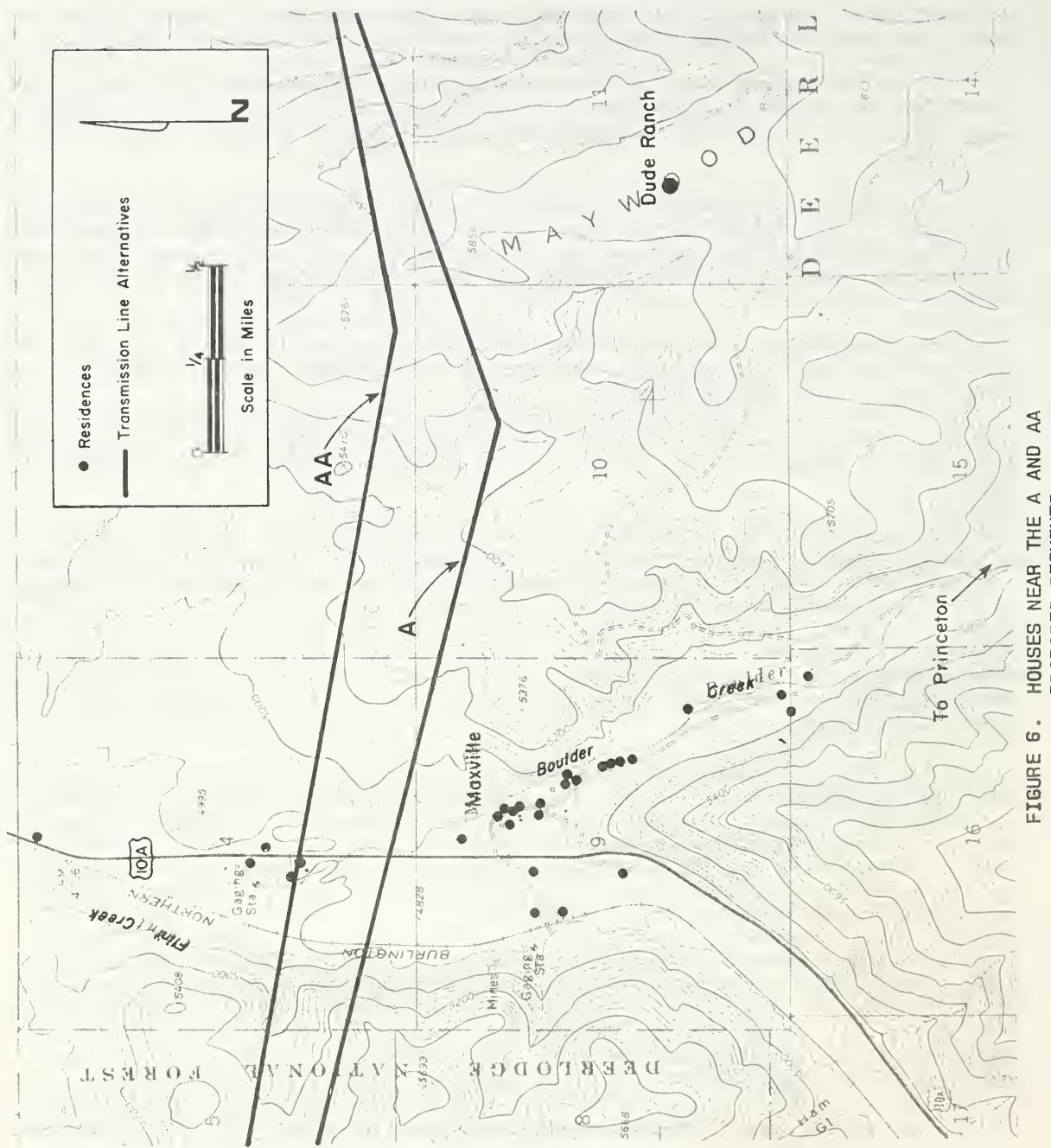


FIGURE 6. HOUSES NEAR THE A AND AA PROPOSED SEGMENTS

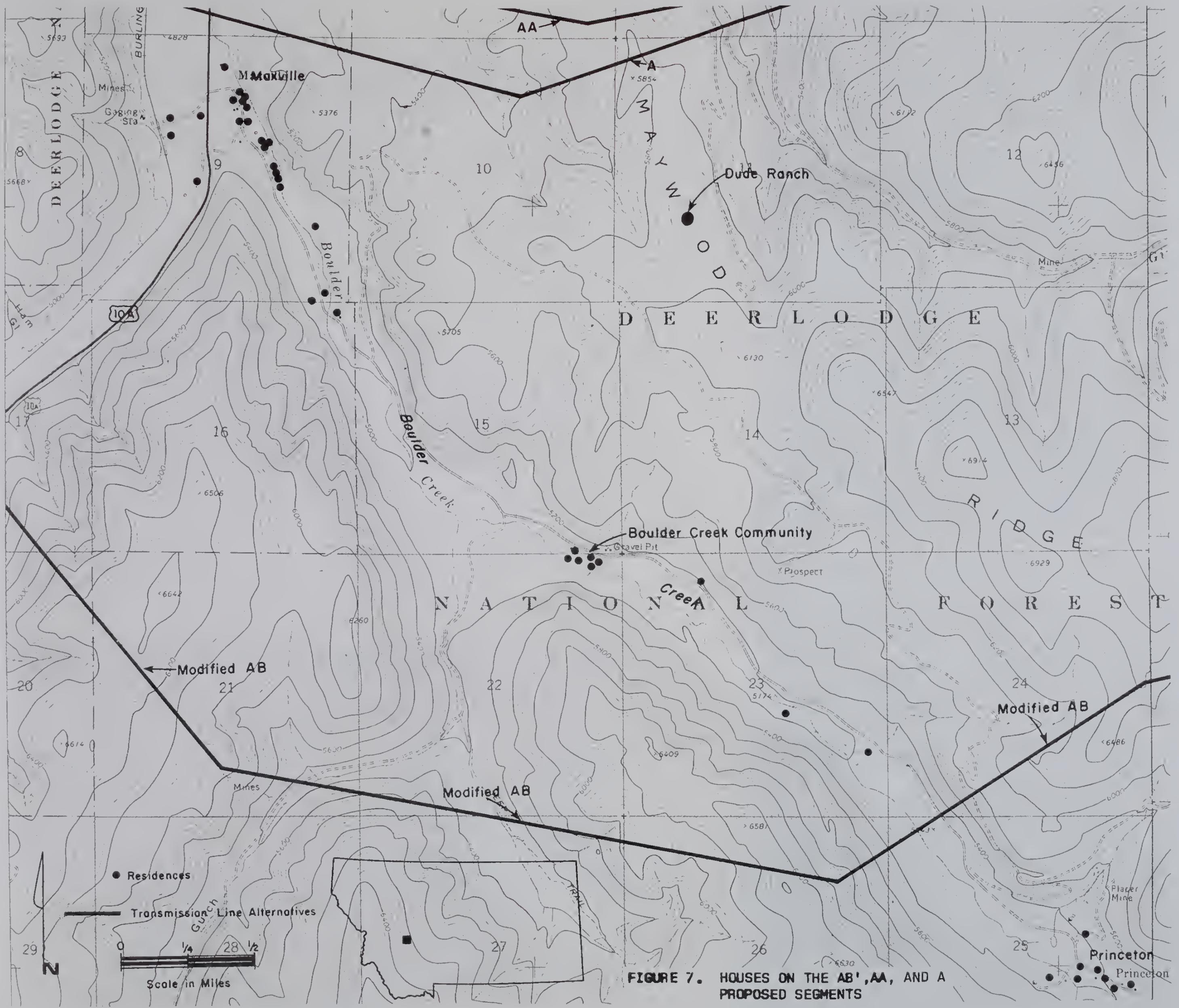


TABLE 1. HOUSE LOCATIONS ON MAXVILLE ROUTE ALTERNATIVES

<u>Route</u>	Impact Zones				
	<u>ROW- 1/4 mile</u>	<u>1/4-1/2 mile</u>	<u>1/2-1 mile</u>	<u>1 - 2 miles</u>	<u>Total within 2 miles</u>
AB' *					
year-round	0	0	2	33	35
seasonal	0	1	9	7	<u>17</u> 52
AA					
year-round	4	2	17	6	29
seasonal	0	0	3	1	<u>4</u> 33
A					
year-round	5	13	8	3	29
seasonal	0	2	2	0	<u>4</u> 33

*Total does not include 1 house and 5 cabins located at the Master Mining Camp. These units have been unoccupied for the past 3-4 years.

TABLE 2. PRESENT USE OF PRIVATE LAND CROSSED BY SEGMENTS A, AA, AND AB'

<u>Route</u>	<u>A</u>	<u>AA</u>	<u>AB'</u>
Rangeland	7-3/4 mi	8-3/4 mi	5-1/2 mi
Residential	1/2 mi	1/2 mi	1/2 mi
Mining	—	1/4 mi	3/4 mi
TOTAL PRIVATE	8-1/4 mi	9-1/2 mi	6-3/4 mi

GCA is opposed to the AA and A alignments. Should AA or A be built, the inability of the local community to substantially affect the agency decision on line location, in spite of strong cohesiveness and organization, likely will cause resentment. Interviews in a study of 500-kV lines in Washington and Oregon indicate some residents harbored enduring long-term antagonism as a result of dissatisfaction with line location. The people interviewed were not organized and did not cooperatively attempt to influence line location. Maxville area residents, who have made considerable efforts to influence the line location, are even more likely to experience indignation.

Route A: Impacts to People:

Route A is the original alignment through the Maxville area. Table 1 shows that 18 homes are within 1/2 mile of the line and 8 more are within 1 mile.

Residents in the Maxville townsite would have a clear view of A, especially in the 1/4-1/2 mile zone, but also in the 1/2-1 mile zone, so visual impacts are greater than with the AA alignment. One or two towers may be skylined along this route.

Other impacts to people are comparable to AA. There is no significant difference between A and AA regarding natural and cultural resource impacts, so the two are discussed as being identical in the following comparisons.

Routes AB' and AA: Natural and Cultural Environmental Impacts

There is a significant difference between alignments AB' and AA in impacts to the natural environment. AB' crosses steep terrain where there is little opportunity for landform or vegetative screening of the line. AB' would require approximately 18 more miles of access road construction or reconstruction than AA. Access road construction and right-of-way clearing will leave long-term scars on the slopes. Erosion would increase risk of stream sedimentation and affect water quality and fisheries. The Aeronautics Division recommends against spanning Boulder Creek. Bringing the line down into that valley requires crossing slopes that are extremely steep, 80-100 percent. BPA does not want to build there because of the engineering difficulty (Driessen 1983). AB' crosses critical elk summer/fall security habitat in the Mount Princeton/Eureka Ridge area and would affect about 75 elk.

Fish and Wildlife Concerns:

AB' crosses critical elk summer/fall security habitat in the Mount Princeton/Eureka Ridge area. DFWP indicates that access road construction would have a severe effect on the 75 elk in that area. The Mount Princeton/Eureka Ridge secure habitat is important because there is little security habitat left in this area due to logging activity in the Douglas Creek and North Fork of Gold Creek drainages.

Further concern has been expressed over elk using a poorly defined area on Silver King and Jenkins ridges. Keeping the line at lower elevations would reduce potential conflicts with elk habitat.

Aeronautics Concerns:

The State Aeronautics Division has expressed dissatisfaction with any high crossing of Boulder Creek because of the increased hazard to air travel through this drainage. BPA has indicated that the crossing of Boulder Creek near Princeton would require lines to be between 400 and 600 feet above the ground (Driessen 1983). The A and AA routes avoid this area altogether.

TABLE 3. GEOLOGY/SOILS CONSTRAINTS ON THE AB¹, AA, AND A SEGMENTS

Route	Slope Categories Crossed by Reference Centerline (in miles)				problem soils crossed by reference centerline (in miles)
	0-15%	16-30%	31-60%	over 60%	
AB ¹	3.6	10.3	11.1	.7	2.9
AA	5.4	10.8	6.7	.4	3.2
A	5.2	11.6	6.2	.4	3.7

Visual Concerns:

Visual impacts to residents are discussed in the sections on social impacts. This section considers visual alteration of the landscape and long-term landscape quality. AB' is preferred by most residents in the area because it puts the line farther from their homes. However, avoiding the Maxville townsite requires putting the line on steep slopes, increasing impacts to residents in Boulder Creek and causing a long-term impact to landscape quality.

The AB' route crossing of Boulder Creek would disrupt a high quality view toward Finley Basin, and would cross an area used for access to semiprimitive recreation on Forest Service land. The line would be a visual intrusion for the residents of Boulder Creek and for the recreationists who use Forest Service land in this area. The view of AB' to travelers on Highway 10A would be brief, although the line would dominate the landscape while in sight. A high degree of visual alteration to the landscape on AB' would result from crossing very steep terrain, with extensive right-of-way clearing and access road construction required. Mitigation such as tower darkening would be minimally effective in reducing the visibility of the line in this area.

In contrast, AA and A cross Highway 10A immediately to the north of Maxville, crossing flatter terrain and taking advantage of both vegetative and landform screening in the transition zone between open terrain of the lower Flint Creek valley and rugged terrain south of Maxville. Mitigating measures, such as darkened towers, would effectively reduce visibility of the line in this area. The line would be viewed as a middleground to background (1/2 to 3 miles) element in the landscape, and most towers would be backdropped by landform and vegetation.

Highly visible aeronautical markings (marker balls and painted towers) are recommended at both the Boulder Creek and the A, AA and AB' Flint Creek crossings (see Aeronautic section of update).

Geology/Soils Concerns:

The impact of constructing access roads and towers in the Maxville area would depend on the steepness of slope and amount of problem soils crossed by the centerline, (including areas of high erosion potential and moderate mass movement potential as determined by the Forest Service), and the amount of access road required including both new roads and reconstruction. The intent of the route recommendation was to avoid as much soil disturbance as possible.

In general, the A and AA routes are the shortest and require the least access road construction (approximately 18 miles). These routes cross the foothills and less steep terrain than the southern routes deeper in the mountains (see Table 3).

The A and AA routes do cross an area of moderate potential for mass movement northeast of Maxville; it was felt that careful siting of towers could bridge much of this area. Off the right-of-way in this same area there is an actively moving slide, possibly caused by logging and road construction. The access road to the dude ranch crosses the base of this slide and might be used during construction with little or no upgrading.

The western leg of the AB' route crosses very steep terrain in the Mohave Creek and West Fork of Willow Creek drainages. This area also has a moderate potential for mass movement. The AA route is viewed as more desirable in this area because it better avoids these steep slopes.

Cultural Resource Concerns:

Some historical and archaeological sites could be affected by the routes near Maxville. Little site-specific work has been done to determine the effect access roads and towers might have on these sites. More historical sites, particularly mining sites, are likely to be encountered on AB'. West of Flint Creek more homesteads are likely to be near AA or A than AB'.

Routes AB' A and AA: Cost

The AB' alignment is estimated to cost \$4.8 million more than the AA or A alignments. The difference in cost results from the number of dead-end towers required, the number of miles of line and of access roads.

Other Centerline Considerations at Maxville

Additional centerline adjustments could take place on two portions of the routes near Maxville. These are not controversial compared to the major decision between AA and AB'. GCA has notified DNRC that it has no preference for the centerline location of AB' east of the Boulder Creek crossing (Tavener 1983). Centerline adjustments may also take place on the western portion of the AB' or AA alignments (see Figure 5). Here the AB' route better avoids a permanent residence, private grazing land, and several historical homesteads. However, this route crosses steeper terrain and more high country used by elk than AA.

Conclusions

The AB' route more successfully avoids people than the AA route, but at a high cost to the natural environment.

GCA's original preferred alignment, Corridor E, avoided permanent residences in the area by a greater distance than AB'. GCA first compromised with the agencies by moving to AC and then to the AB' route. The group is opposed to the AA and A routes.

GCA's highest priority is routing the line to avoid people and private land. GCA believes that the wishes of the people who would be most affected in the Maxville area are more important than visual alteration of steep slopes that are not used by the community. The community does not regard the environmental concerns raised by DNRC as significant. They believe that avoidance of people was the deciding factor in selecting all other portions of the route, and should be in the Maxville area also.

The Siting Act requires DNRC to recommend a site that would meet the standard of minimum environmental impact, considering all the environmental factors listed in the law (75-20-503, MCA). The siting criteria used by DNRC gave the highest weight to avoiding people, but also considered impacts to the natural environment. DNRC agrees that AB' does the best job avoiding people who live within 1 mile of the line, although residents and landowners in Boulder Creek would be affected.

In DNRC's view, the environmental impacts of AB' would be much greater than for AA. However, because of the uncertainty of the buyout option, and the feeling of the community, the social impacts will surpass the environmental ones.

DNRC concludes that the environmental consequences of AB' are significant and adverse, but not sufficient to outweigh the concerns of community residents who would be affected by the line on a daily basis. DNRC recommends AB'.

UNDERGROUND TRANSMISSION OPTIONS

During its hearing in Missoula on March 11, 1983, the Board of Natural Resources and Conservation asked DNRC to review the cost estimates of undergrounding at the Miller Creek (Lolo) crossing and to evaluate engineering feasibility and costs of undergrounding at Rock Creek and Clinton.

Because of the short time available to conduct the evaluation, the information obtained is reconnaissance level only; the specific location of circuit undergrounding, if any, is not definite.

Construction Cost Estimates

Cost estimates for undergrounding are based on six self-contained-oil-filled conductors (SCOF) with a total capacity of 2,000 MW. Table 4 is a summary of estimated double-circuit costs provided by DNRC's contractor.

Cost Comparisons

The DNRC cost estimates per mile of line differ from BPA costs in two respects. First, cable costs, based on April 1981 information from Pirelli (a supplier of cable), were adjusted by DNRC's contractor to \$80 per linear foot, compared to BPA's estimated cost of \$110. Second, installation/construction costs prepared by DNRC's contractor are about 1/3 the cost estimated by BPA. Table 5 is a cost comparison for double-circuit underground construction.

Notwithstanding the \$2.1 million difference between the BPA and DNRC contracted estimates, undergrounding costs at least 5 times as much as customary overhead lines, or about \$5.1 million per mile.

Undergrounding: Advantages and Disadvantages

The following comparison assumes that undergrounding would be across relatively flat terrain in easily excavable materials with a minimum of blasting in bedrock. This is in keeping with the conditions found at the Rock Creek, Clinton and Miller Creek (Lolo) crossings. Table 6 lists general advantages and disadvantages of undergrounding compared to overland construction.

According to BPA, there are only a few cases where underground transmission is deemed feasible (BPA 1977). These are:

1. Highly urbanized areas where the cost or unavailability of overhead right-of-way makes the underground transmission alternative the least costly or only alternative.
2. Unique resource areas where important or unique resources may be impacted and a route around the area is impossible or too expensive to obtain.
3. Locations where underground transmission provides a shorter, economically attractive route. An example would be the crossing of a large body of water with underground/submarine cable rather than taking a longer route around the body of water.
4. Locations where system reliability may be affected. For example, one transmission line crossing several other lines where the mechanical failure of one line may cause multiple line outages.
5. Locations where overhead construction is impossible or impractical, such as transmission of power across a large, deep body of water to an island.

Rock Creek Underground

Undergrounding at Rock Creek is being evaluated because of difficulties in selecting an overhead route that sufficiently avoids potential environmental impacts and the problem of aircraft safety.

TABLE 4. DNRC'S ESTIMATED COSTS* FOR THE ROCK CREEK AND CLARK FORK UNDERGROUND CROSSING (self-contained oil-filled cable)

	<u>ROCK CREEK</u> <u>CROSSING</u>	<u>CLARK FORK</u> <u>CROSSING</u>
<u>Cost per Linear foot</u> (in hundreds of dollars)		
Cables	561	561
Right-of-way survey	14	15
Installation	265	267
Engineering & contingencies	<u>126</u>	<u>126</u>
TOTAL COST PER LINEAR FOOT	966	969
Cost per mile	\$5.1 million	\$5.1 million
Length of route	10,000 ft. (1.89 mi)	11,500 ft. (2.18 mi)
TOTAL COST	\$9,661,000	\$11,141,000

*The cost estimates considered the following items:

Provided by BPA (at cost)

- 1 - Equipment: cables, oil
- 2 - R-O-W at \$4,000/acre; surveys and borings at \$40,000/mile

Installation by Contractor

1. Access, clearing, restorations
2. Trenching
3. Install cables
4. Trench backfill
5. Splices
6. Oil fill, pressure tests
7. Protective concrete pads (contingent)

Fixed Costs

8. Oil pressure systems (& stop joints)
9. Terminals (potheads, relays, arrestors)

The Project Cost was the sum of I and II plus 5 percent for engineering and 10 percent for contingencies.

TABLE 5. DNRC'S AND BPA'S ESTIMATED COSTS FOR UNDERGROUNDING PER LINEAR FOOT (hundreds of dollars).

Cable	BPA	DNRC	Difference	
			Per Ft.	Per Mile
Cable	\$768	\$561	+\$207 *	+\$1.1 million
Other material, terminals, oil reservoirs	215	170	+ 45	+ 0.2 million
Construction	272	90	+ 182**	+ 1.0 million
Engineering and contingencies	87	126	- 39	- 0.2 million
			Net:	\$2.1 million

* Percent difference between DNRC and BPA = 37%

** Percent difference between DNRC and BPA = 202%

TABLE 6. ADVANTAGES AND DISADVANTAGES OF UNDERGROUND TRANSMISSION LINES COMPARED TO OVERHEAD LINES

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Less R-O-W required	Costs at least 5 times more than overhead
No aeroneutical hazards	Construction usually takes longer
No electromagnetic effects	Reliability is unknown
No interference with radio and tv	Maintenance is more intensive
Can reduce visual impacts depending on the site	Does not eliminate all above ground structures

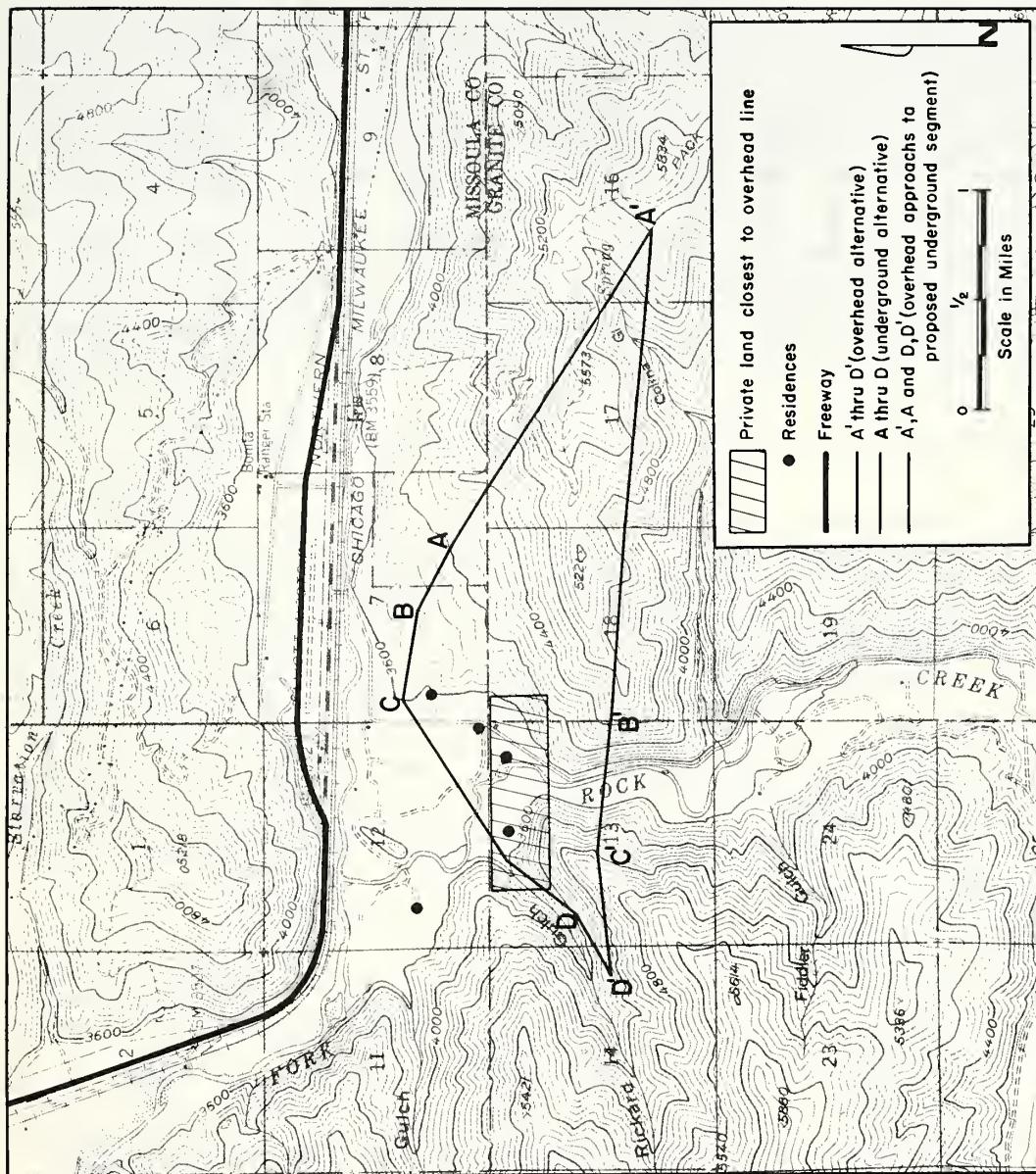


FIGURE 8. ROCK CREEK UNDERGROUND ROUTE

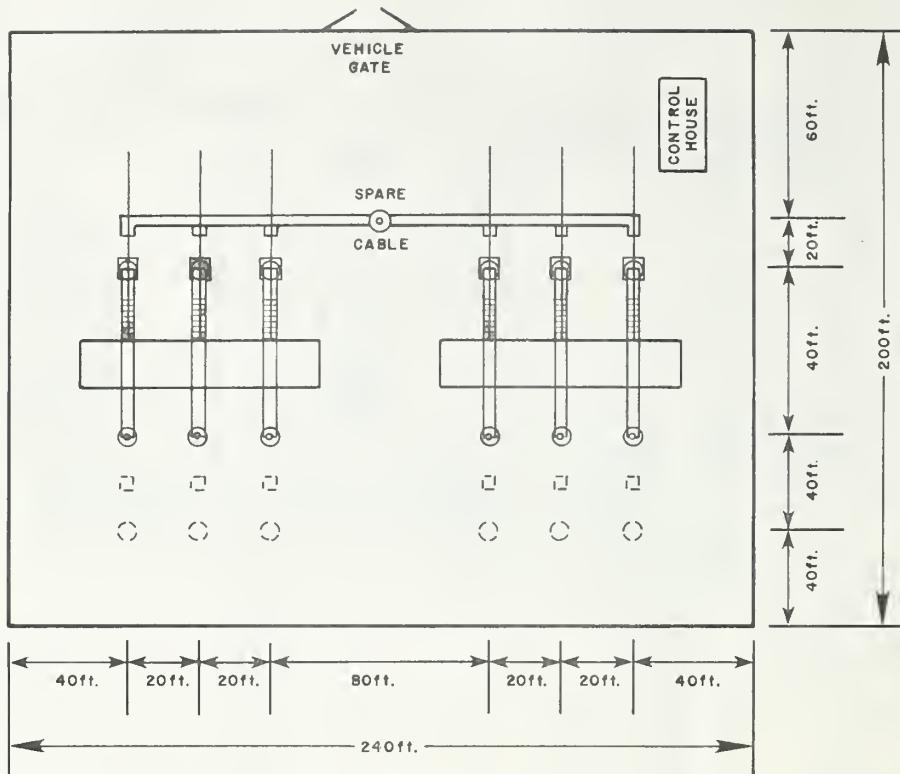


FIGURE 9. PLAN VIEW SCOF TERMINAL

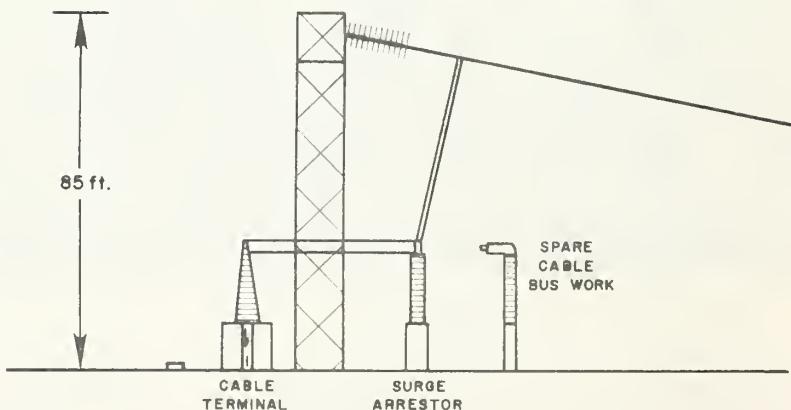


FIGURE 10. SIDE VIEW SCOF TERMINAL

Feasibility

Field data indicate about 10,000 feet of underground line would be necessary at Rock Creek. Access to the eastern terminal would require the double-circuit overhead transmission lines to drop 1,600 feet from the ridge crest in about 1.7 miles (Figure 8). From this terminal to the Rock Creek road, about 3,500 feet of underground line would pass through a hayfield and forested area on an upland bench; the remainder would cross the floodplain and channel of Rock Creek, up to the western terminal near the mouth of Rickard Gulch (Figure 8). There are no more than two or three dwellings along this underground alignment, and the line would miss these by several hundred feet. Figures 9 and 10 provide two views of the above ground terminal.

Excavation would be through alluvial gravels in the floodplain and through colluvial materials and bedrock on the steep slope between the hayfield and floodplain near contour elevation 3,600 feet. Since no field examination was made of the hayfield and adjacent forested area, the materials are not specifically known. However, the upland bench appears to be an old landslide. Figure 11 is a cross-section diagram showing the proposed double-circuit 500-kV transmission cables placed underground.

The Rock Creek road would be the only public road crossed, and the crossing probably could be trenched.

Constraints

The most difficult problems in undergrounding at Rock Creek relate to the difficulty of locating the overhead transmission line segments between BPA's latest overhead transmission line alignment and the terminal (Figure 8). Segments A'-A (1.7 mi) and DD' (.4 mi) are the overhead segments of the Rock Creek underground alternative. Both segments would cross extremely difficult terrain, and the eastern segment would be highly visible from I-90. The locations of the angle points A' and D' are based on the latest BPA mapping.

Slope failure is possible, especially on the eastern segment (ABC), and could preclude locating underground circuits through this area. The seriousness of this danger would have to be determined through engineering studies. The trench crossing at Rock Creek would be excavated during low water when fish aren't spawning, presumably during the late fall and winter.

Costs

Cost comparison of the overhead and underground crossings at Rock Creek are based on the following:

For Underground

1. Underground segment length	10,000 ft (ABCD) =	\$9,661,000
2. Eastern overhead approach	9,000 ft (A'A) =	\$1,620,000
3. Western overhead approach	<u>1,700</u> ft (DD') =	<u>\$306,000</u>
TOTAL	20,700 ft	\$11,620,000

For Overhead

Overhead segment length	17,000 ft (A'B'C'D')	\$3,060,000
TOTAL COST DIFFERENCE		\$8,560,000.

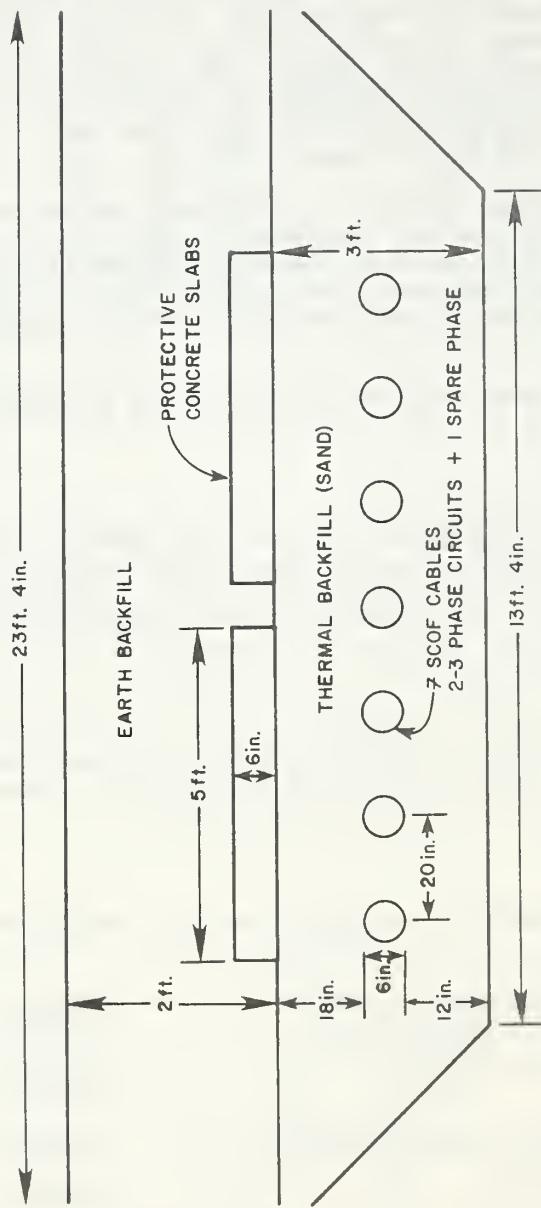


FIGURE 11. SCOPE UNDERGROUND CROSS SECTION
WITH CABLE LOCATION

Clinton Underground Crossing

Should a northern route be selected from Garrison to the west, a crossover point at Clinton is possible (Figure 12). The route selected would enter from the east down Starvation Gulch, follow along the hillside to the section line between sections 2 and 35, turn west and cross under I-90 and the railroads. From this point west to the Clark Fork the cable would be sited to incur the least land use impact. After crossing the river, the tentative route would follow Schwartz Creek upstream to a point where a terminal connecting to overhead lines could be suitably located.

Feasibility

Nearly all of the Clinton crossing would be in alluvial gravel. Some bedrock might be encountered in the bottom of Starvation Gulch, but this cannot be known without engineering data.

Crossing I-90 would require directional boring, a technique neither new nor difficult. The cost of boring under I-90 and the railroads would total about \$250,000.

BPA has indicated that a suspended crossing of the Clark Fork is more appropriate than a buried cable crossing because of channel erosion of the river. A catenary suspension or concrete bridge about 400 ft upstream from the existing county bridge are two possible solutions.

Constraints

The most serious constraints to the Clinton crossing are the possible difficulty in routing the overhead line to the eastern terminal in Starvation Gulch, and locating a suitable terminal to the west in Schwartz Creek. The overhead access in Starvation Gulch is across very steep terrain and the undergrounding would cross private property near I-90 (Figure 12). From I-90 west to the western terminal, the underground segment would be entirely on private land.

There are no known geologic/engineering constraints to this crossing but excavation costs could greatly increase if bedrock is encountered in Starvation Gulch.

Cost

Total cost for material and installation is estimated at \$11,141,000 (see Table 4). These costs do not include estimated costs for a suspended river crossing either by bridge or catenary suspension structure. A bridged crossing using 2 piers and three 80-ft spans would cost about \$100,000 more than a trench crossing at \$28,000. A catenary suspension would exceed trenching by about \$80,000. Costs on both overhead alternatives include \$28,000 for splices and connections (Cushing 1983). Thus, a suspension crossing would add approximately \$80,000 to \$100,000 to the above total.

Miller Creek (Lolo) Crossing

BPA's cost estimate of \$7.1 to \$7.4 million per mile for the Miller Creek crossing was supported in a GAO report dated May 7, 1982. However, the report noted that uncertainties in material cost and installation costs could make the actual costs higher or lower than estimated. BPA's estimated cost for 4.5 miles of underground was \$32.1 million.

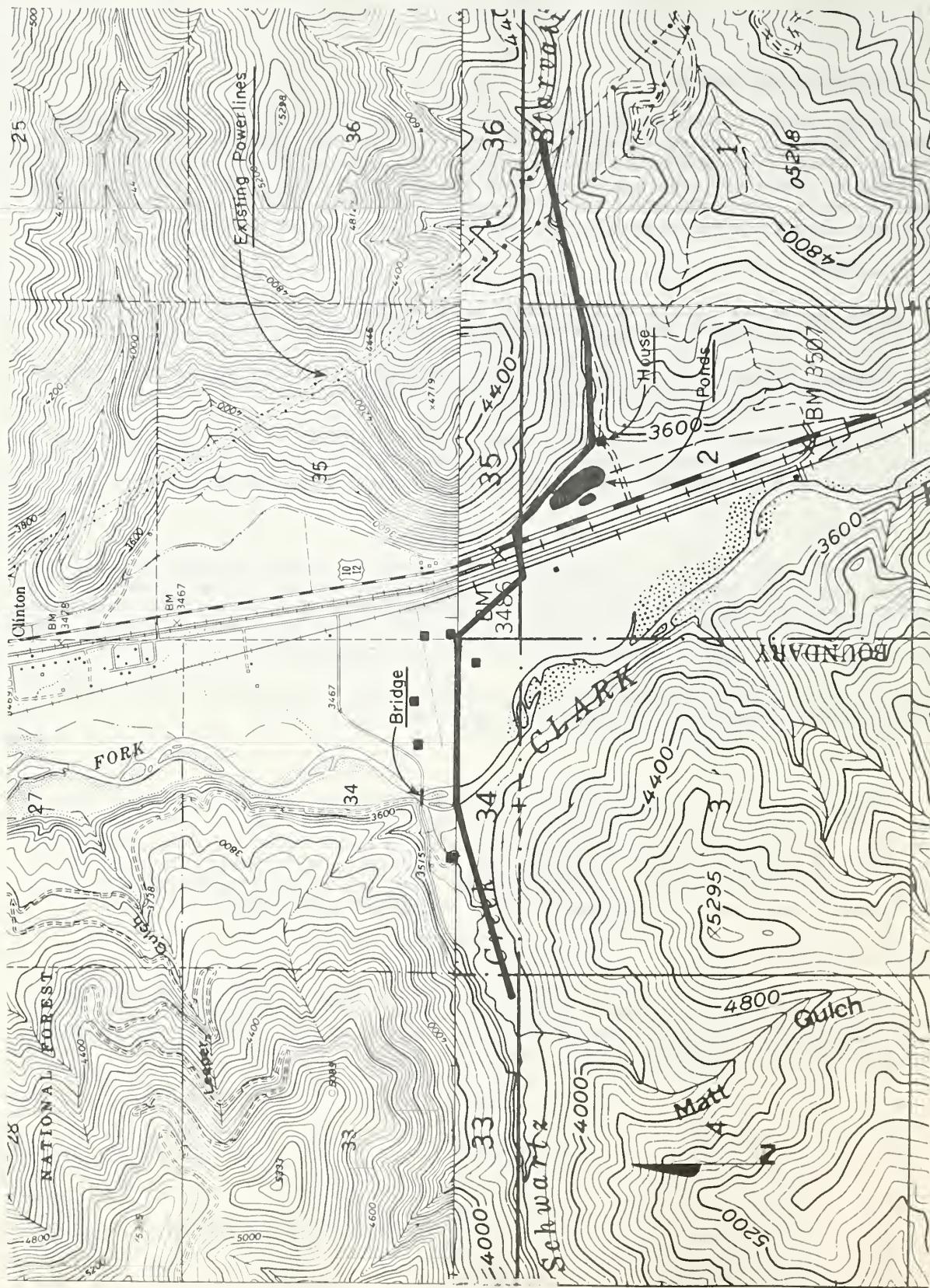


FIGURE 12. CLINTON UNDERGROUND ROUTE

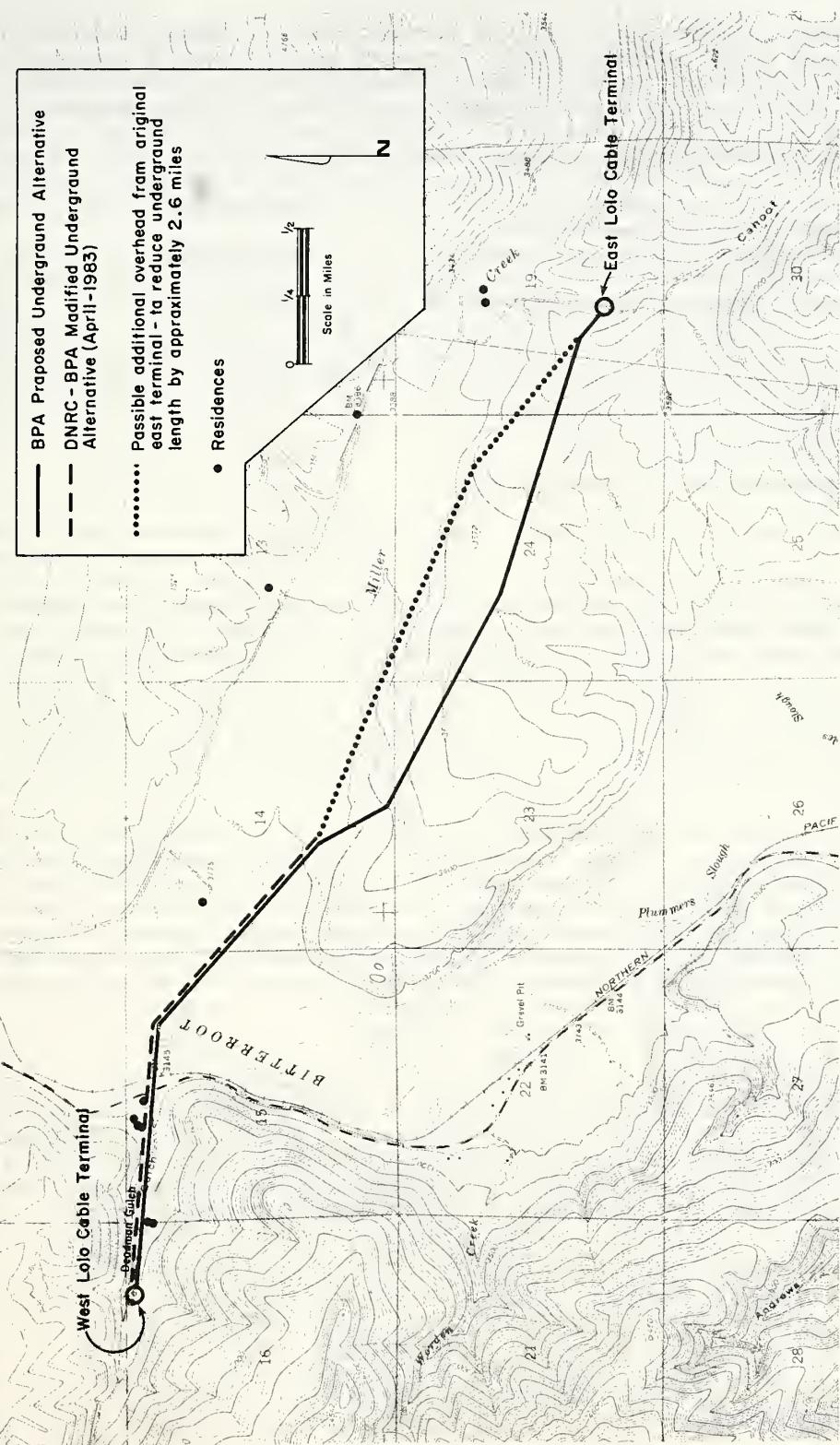


FIGURE 18. MILLER CREEK UNDERGROUND ROUTE

DNRC personnel reviewed the site with the contractor and BPA engineers on March 22 and determined that the underground segment could be reduced about 2.6 miles by extending overhead service to a point (B) near the center of Section 14 (Figure 13). From here, undergrounding would continue across the Bitterroot River to BPA's indicated terminal point (C) in Deadman Gulch.

A direct cost comparison for the revised Lolo route is as follows:

BPA: 4.5 miles @ \$7.13 million/mile	\$32.1 million
DNRC: 1.9 miles @ \$5.10 million/mile plus	
overhead construction: 2.6 miles @ \$950,000/mile	<u>\$12.17 million</u>
DIFFERENCE BETWEEN BPA AND DNRC	\$19.9 million

In an effort to lessen visual impact in Miller Creek, improved appearance self-supporting steel or concrete structures could be used in place of lattice towers. BPA and DNRC are currently evaluating the feasibility of improved appearance structures for high visual impact sites.

Distribution of Additional Cost for Undergrounding

The estimated cost of undergrounding is \$11.62 million at Rock Creek and \$12.17 million at Miller Creek, for a total of \$23.79 million, compared to \$4.87 million for overhead. If the line is underground at these locations it would reduce the visual impact to residents and other users of these areas. The cost will be paid in the form of increased transmission costs. The additional costs associated with underground construction would represent a very small increase in utility bills. For example, the additional \$23.89 million in construction costs to go underground, when amortized at 9 percent interest for 30 years, leads to an additional revenue requirement of about \$2.32 million per year. If this were recovered entirely from the customers of Puget, Portland and Washington Water Power it would require an addition of 0.2 percent on total revenues. For a typical residential customer in Portland using 1000 kwh per month this would mean about 7.85 cents per month, or 94 cents per year.

The distributional question is clearly important. The social impacts of the transmission line are borne mainly by residents of the area crossed by the line, while the benefits of the line are dispersed among many customers of the west coast utilities. Conversely, reducing the impacts through mitigation reduces the social cost to the residents of the area crossed by the line, with the cost dispersed among many electricity consumers. However, the distribution question is not the most important one; an equally important question is that of economic efficiency. Does the expenditure of \$23.79 million for undergrounding the line buy a reduction in impacts at least as great in value?

Conclusions

Undergrounding appears to be a feasible alternative to resolve some of the problems of overhead transmission lines at selected points. However, the cost of undergrounding is estimated at between 5 and 7 (BPA) times the cost of overhead construction. Any decision to use undergrounding must evaluate the environmental benefits of its use compared to the cost. In addition, full mitigation of overhead transmission line impacts and some form of compensation should be seriously considered when comparing the relative advantages of underground and overhead transmission facilities.

ACCESS ROADS

The adverse impacts of access roads on Montana's wildlife and wildlands is a major consequence of BPA's proposed 500-kV line. DNRC's draft EIS said that about 466 miles of access roads would be required on the Taft South Route. Forest Service figures show that half of these roads would be new construction while the remainder will be major upgrades of existing low standard logging or single track roads. Roads will be built according to Forest Service standards which call for roadbeds at least 16 ft wide to accommodate construction and future activities.

The use of heavy equipment on the mountainous terrain of the Taft South Route would result in major disturbances from cut and fill operations for both new and upgraded roads. The increased access provided by these roads would cause adverse impact to elk security. They also would lead to erosion and a consequent risk to stream fisheries from increased sediment loads.

Policies of state and federal agencies on road management and closure have been and are being debated in Montana. DFWP and the Forest Service disagree on road management objectives and priorities, primarily because state and federal agencies have different resource management goals. DFWP is concerned about maintenance of existing recreational opportunities and hunting quality in Montana. Conflicts between these two management directions are being negotiated among Montana state government, conservation groups, and the Forest Service. This process gives added importance to the management and closure of access roads in the attempt to site the 500-kV line with low environmental impact.

Impacts of access roads built by BPA could be cumulative, especially if these roads are used by the Forest Service to enhance saleability of timber in areas currently unroaded. Many of these locations are subject to uncertain management direction because of the Rare II issue (see Rare II discussion).

The following sections discuss the major impacts of access roads on elk security and recreational opportunities, policies and practices of DFWP, the Forest Service, BLM, and BPA on road closure and management, and effectiveness of mitigating techniques to protect wildlife values related to hunter opportunity and hunting quality. The effect of access roads and future logging is also discussed.

Impacts of Access Roads on Elk

The primary impacts of access roads on elk are the loss of secure habitat and the resulting reduction in hunting opportunity and quality. These impacts are documented in the western United States. Logging and other developments diminish elk security areas in Montana. Access roads allow hunters to enter elk security areas more frequently and effectively, allowing a high rate of kill in the first few days of hunting season. Increased vulnerability of animals to hunting as a result of increased road density and logging, often results in more restrictive hunting regulations and shorter seasons, and may eventually result in hunting by permit only.

In most western states where elk hunting and high access road density occur, the loss of high security elk habitat has required shortening hunting seasons, in some cases to less than one week. In Oregon, 98 percent of the bulls harvested are yearling spike bulls, indicating high hunter efficiency has greatly reduced the age of male elk harvested. The efficiency of hunters in finding and shooting bull elk is so great in Oregon that in some hunting districts the current hunting season sex ratio is only one antlered bull per 100 adult elk (Lonner 1983).

Road Management Policies of DFWP, Forest Service, BLM and BPA

DFWP Policies

DFWP's Road Management Policy is intended to allow continuation of a five week hunting season and to maintain hunting opportunity and quality. The Road Management Policy says:

The statewide objective for elk in 1985, established by the Montana Department of Fish, Wildlife and Parks (1978), is to provide 676,300 days of elk hunting annually at a success rate of 15% and an average effort of 46 hunter days per elk harvested. That objective represents an annual return to the Montana economy of \$27,052,000 to \$40,578,000 (\$40-\$60/elk hunting day). The present 35 day elk hunting season in Montana provides a diversity of choice for the sportsman with regard to time, weather conditions, hunter density and area. The Department, thereby, can expect to accomplish its stated objective. Implementation of more restrictive seasons, as a result of continued reduction in habitat security, however, will significantly reduce recreational hunting opportunities and would jeopardize the attainment of stated objectives. In fact as we move toward more and more permit-only hunting, fewer and fewer hunters will be allowed to hunt.

It is DFWP policy to encourage road closures that would result in sizeable portions of drainages, or small drainages in their entirety, to serve as elk retreats on both summer and winter ranges (DFWP 1978).

Forest Service Policies

Most of the land crossed by the Montana portion of the Garrison-Spokane line is on the Lolo or Deer Lodge national forests.

Forest Service policy regarding road closures is primarily determined by two planning processes. The National Forest Planning Process provides general forest-wide management direction, policies, standards, and guidelines. At present, only the Lolo National Forest has issued a draft Forest Plan. A moratorium recently was placed on issuance of other Forest Plans, including the Deer Lodge National Forest Plan, until the RARE II issue can be resolved (see RARE II update). The Deer Lodge Forest Plan was scheduled for release in the fall of 1983. The Travel Planning Process specifies which roads are to remain open and which are to be closed to the public. The travel plans are revised every two years based on public comment and agency policy. The travel planning process therefore offers little guarantee that road closures would be maintained over the long term, in that management goals for individual roads change so frequently.

The Forest Service Northern Region is developing a road policy that would apply to all regional forests in the region. This policy would be incorporated into the Forest Plans for the individual national forests. With respect to roads and big game habitat, the Forest Service recognizes that there is a close relationship between road density and habitat quality for big game species, particularly elk. Much of the Forest Service road policy is being shaped by the findings of the Cooperative Elk-Logging study, in which the Forest Service participated. Recommendations of this study, if strictly followed, would minimize the effects of logging and roading on elk, but would not eliminate the impacts on elk security.

Preservation of quality elk habitat and hunting experiences has been a major issue in the Forest Service planning process. Although only 18 percent of Montana is national forest land, 70 percent of the state's elk habitat is found there, and 80 percent of the elk harvest takes place on national forests. In the forest plans, each national forest spells out management objectives for maintaining or increasing elk numbers. As with other resources on national forest land, wildlife management direction is determined on the basis of public comment and interdisciplinary study, in which the attempt is made to balance wildlife and other interests such as timber.

The Forest Service has entered with BPA into a Memorandum of Understanding stipulating that the Forest Service would maintain any powerline access roads that would become part of the Forest Transportation System. Gates necessary to restrict public access would be installed by BPA at Forest Service request, BPA would maintain roads and gates that did not become part of the system.

Lolo National Forest

The proposed Lolo National Forest Plan was issued in January of 1982.

According to the Lolo National Forest, the arterial system is nearly complete, but the collector system is only 75 percent complete and the local road system is only 20 percent complete. The Lolo National Forest projects that 11,000 miles of system roads will be in place by 2030 (USFS 1982). All arterial roads would be open to public use. Primary collector roads are seldom closed to public use except during emergencies, but secondary collector roads "may be closed intermittently to achieve specific resource goals such as to reduce stress to elk on their winter range" (USFS 1982). Most local roads are normally closed when resource work is complete.

Approximately 635 miles of new collector roads would be built in the Lolo Forest, of which 130 miles would be open to unencumbered public use. In all, 61 percent of the collector road system would be open for public use (USFS 1982). The Forest Service is considering recommending in the final plan that elk numbers be increased by the end of the planning period. However, the strategic plan for protection perpetuation and use of Montana's wildlife developed by DFWP indicates that increasing elk numbers does not necessarily increase hunter opportunity or hunting quality (DFWP 1978). DFWP feels the great increase in logging and roading called for in the forest plan would make it difficult to achieve an increase in elk numbers. Logging, roading and the reduction of secure habitat results in degradation of hunter opportunity and hunting quality (DFWP 1978).

The National Forest Management Act of 1976 (P.L.94-588-8) regulations says, "Unless the necessity for a permanent road is set forth in the Forest development road system plan, any road constructed on land of the National Forest System in connection with a timber contract or other permit or lease shall be designated with the goal of reestablishing vegetative cover on the roadway...within 10 years..." Lolo National Forest policy is that this section applies only to temporary roads, and that all roads addressed in the proposed Forest Plan are considered permanent roads, as part of the National Forest Transportation System (USFS 1982).

The revised Lolo National Forest Travel Plan, which would specify which roads would be open during the next two years, is scheduled to be published in May of 1984.

Deer Lodge National Forest

The Deer Lodge National Forest has not yet issued a draft forest plan. This plan will be released in the fall of 1983 unless delayed by the moratorium imposed by the RARE II issue.

The revised Deer Lodge National Forest Travel Plan is scheduled to come out in July of 1983.

The Deer Lodge National Forest recognizes a growing demand for nonmotorized recreation on National Forest Land, and projects a five-fold increase in visitor-days of use by nonmotorized recreationists over the next 50 years. The need to control access to some areas is likely to be discussed in the Forest Plan.

BLM Policies

Very little BLM land is crossed by the proposed Taft South route, although Taft North crosses a substantial amount.

BLM has not entered into a Memorandum of Understanding with BPA regarding access roads, so road closure policy is dealt with on a case-by-case basis. In the foothills of the Elkhorn Mountains on the Townsend-Garrison segment, the powerline access roads cross much land that BLM considers important wildlife winter habitat, and BLM feels that the guidelines of the Cooperative Elk-Logging study should be followed as much as possible. BLM feels that powerline access roads in this area should not only be closed but should be put back to a semiprimitive state and seeded, preventing public access, but still allowing emergency access to BPA. Final agreement has been worked out between BLM and BPA regarding how much restoration of original conditions would take place on these roads. BPA will scarify, reseed, and gate BPA access roads on BLM land in this area. BLM is working cooperatively on the Travel Plan with the Deer Lodge National Forest.

BPA Policies

BPA intends to retain permanent road access to each tower site from Townsend to Spokane. Public access to these permanent access roads would be restricted as much as possible to reduce the risk of vandalism in accordance with landowner preference. On private land, however, the landowner has the right to determine if the access road will remain open or closed. If the landowner desires a locked gate, BPA will install it.

On national forest land, BPA and the Forest Service will jointly decide which roads are to be kept open and which are to be closed. The status of specific roads and location and specifications of gates will be noted in the right-of-way agreement and specified in the project plan. There is no specific BPA policy on whether to close access roads on national forest land; the determination is made on a case-by-case basis.

Mitigating Impacts Caused by Transmission Line Access Roads

The adverse effects of access roads on habitat security and hunting opportunity/quality has resulted in attempts to reduce these impacts through road closure. The success of road closure has been variable in western Montana. In the Spotted Bear area near Kalispell, for example, road closures have kept out an estimated 95 percent of unauthorized vehicles, whereas in the Tally Lake area in the same vicinity, road closures were less than 50 percent effective.

There is no totally secure gate nor are road closings fully effective in restricting unauthorized vehicular use. Trail bikes, often used by hunters, easily skirt gates and barriers.

Even if a physically secure gate could be designed, administrative or policy decisions could neutralize its function. Public desire to use roads has reversed the Forest Service road closures in the past.

Public pressure to open gates results in year-round potential intrusion on roaded areas. Animals that can adapt to some seasonal activities cannot tolerate continued year-round disruption of their habitat.

Attitude surveys conducted by DFWP (Thomas 1980) show that hunters do not favor increasing forest road access during big game hunting season. In the Missoula area, 47 percent of the hunters sampled favored some reduction of forest road access with half of those favoring a great reduction and the other half a moderate one. Thirty-seven percent of hunters interviewed favored maintaining existing levels of forest road access during hunting season. In the Swan Valley, 86 percent of the hunters surveyed favored the existing or reduced forest road access during hunting season, and 8 percent favored increased access. DFWP concluded from the surveys that hunters support the present road closure policies and desire further reduction of forest access during big game hunting season.

The most effective way to reduce the loss of habitat security is to reduce road construction or to obliterate and reclaim the road after use. If roads cannot be reclaimed entirely, obliterating and reseeding 1/8 mile of the road where it meets existing system roads is effective in preventing vehicular use. Planting shrubs on a roadbed can obscure the road before the public becomes accustomed to using it. Rapid shrub growth should be enhanced by transplanting large fast-growing specimens and by seeding with rapidly growing grasses and forbs. If emergency conditions occurred, reclaimed roads could accommodate it.

Cost and Enforcement of Road Closures

The standard gate of four-inch steel pipe, supported by concrete footings, costs approximately \$1,000 to \$3,000 to construct and install. To enforce road closure, one person would be required per ranger district during the fall with less intensive enforcement during other seasons. Airplane surveillance and court costs would result in additional expenses not normally incurred by field personnel. DFWP has no authority to close roads on Forest Service land, so the Forest Service would have to provide the required surveillance and enforcement.

Relationship of Garrison-Spokane Project and Forest Service Logging Plans

The significance of the impacts of the Garrison-Spokane transmission line cannot be evaluated without considering how projected logging and the transmission line will interact to affect elk and other big game. Lonner and Cada (1982) discussed the effect of past logging on elk hunting in Montana and how elk hunting regulations have become more restrictive since 1960, when 84 percent of elk hunting areas had either sex seasons up to two months long. Lonner and Cada wrote:

During the 1960's extensive logging in formerly unroaded forests resulted in a significant increase in access with substantial reductions in elk hiding cover. This, combined with an increase in hunter numbers, necessitated a return to more restrictive seasons to protect elk populations from an overharvest.

Logging not only means at least a temporary reduction in hiding cover (trees), but a permanent establishment of logging roads. This reduction in hiding cover since 1960 will continue to be cumulative until the year 2000, since the time for regeneration of hiding cover on logged sites will take at least 40 years.

Wildlife managers have recognized that these modifications may increase harvest rates, reduce recreational opportunity, concentrate elk on limited areas or shift them to suboptimum habitats, and change the quality of hunting.

The Lolo National Forest Plan outlines Forest Service intentions to log extremely important elk security areas. The Garrison-Spokane transmission line project is being used to subsidize road construction for timber harvest in some of these areas, such as in the Eight Mile-Harvey Creek area (Silver-King Rare II study area) and in the West Mountain area near Alberton. The Eight Mile-Harvey Creek timber sale has not been bid on during past timber sales because the timber is not considered profitable to harvest at this time. However, current Forest Service policy encourages the harvest of such areas by building roads. In the past, the timber purchaser was responsible for bearing the costs of access road construction for timber harvest. In recent years the Forest Service has become increasingly committed to subsidizing marginal timber sales by "pre-roading" to make the harvest profitable for the purchaser of the timber. As stated in the Lolo National Forest Plan, "Now, there is a need for pre-roading timber harvest areas because timber values have not been sufficient to amortize the cost of road construction and offer an economically feasible timber sale" (USFS 1982). BPA's transmission line access roads provide the Forest Service with an opportunity to "pre-road" areas of marginally profitable timber sales to make them more economical to harvest.

The road network proposed for the West Mountain and Eight-Mile-Harvey Creek areas far exceeds the needs for transmission line construction and maintenance (see below). The extra miles of road would significantly jeopardize existing security habitat, are not necessary for the Garrison-Spokane project, would create serious soil/water problems, and would increase the cost of the project (see "Proposed Road Relocation" below).

The Forest Service has cited two reasons for the construction of access roads in excess of those necessary to build and maintain the 500-kV line. First, the Lolo Forest draft plan calls for logging of most nonwilderness areas in the forest over the next 50 years. Second, the Forest Service feels that timber harvest roads eventually will be needed and building a separate system of single use road only for access to the powerline would result in greater total number of roads and hence greater impact and costs to the Forest Service over the long term. Pre-roading is controversial and conflicts with current or past DFWP resource management policy, and is being done on the basis of policies contained in draft regional and Lolo Forest management plans. These plans are now being reviewed by the public and Montana state government.

DFWP challenges this premise and feels it is not certain that areas without transmission line access road construction would be economical to log. It may be that if an area proposed for logging were not subsidized by transmission line access road construction, that logging would not take place for 20 or more years or not at all. The 20 or more years would provide elk security, which translates into more hunter opportunity, for that period of time. The primary contention of DFWP is that security for elk should not be prematurely sacrificed when both political philosophy and future demands on the forest resource can and do rapidly change.

Road Relocation Proposals

DFWP reviewed proposed tower and road locations on national forest lands for portions of the Taft South route. This review could not be performed for all portions of the route because field checking and mapping of tower locations is not complete. Approximately 100 miles of the centerline have been evaluated by state biologists for possible tower and access road relocations. DFWP has suggested changes to reduce wildlife impacts along only four miles of the project. The centerline cannot be reviewed on approximately 70 miles of the route because towers and access roads have not been mapped in these areas: 1) The Maxville area between angle point 3 and tower 2107+50 (approximately 20 miles); 2) East of Rock Creek to Hollowman Creek (approximately 13 miles); 3) From Sheridan/Nemote Creek to Second Creek near Lozeau (approximately 5 miles); 4) From Wood Gulch, north of Superior, to the Clark Fork River crossing at St. Regis (approximately 11 miles); 5) From Tamarack Creek to Twelve Mile creek near De Borgia (approximately 10 miles).

The following material does not necessarily address all of the areas where tower/road relocations would reduce adverse impacts to wildlife, especially in those areas where additional engineering information and maps are necessary before more relocations can be suggested.

Harvey/Eight Mile Creek

The Harvey/Eight Mile Creek drainage is occupied at least part of the year by an elk herd numbering more than 200. The road locations proposed by the Forest Service in the Harvey/Eight Mile Creek area (Silver King Rare II Study Area) are shown in Figure 14. The proposed new road extending from point A on the Eight Mile/Harvey Ridge Trail to point B would cross the Rare II area and provide a through-road from Gillespie Creek Road to the Senia Creek area northwest of Maxville. This road does not appear to be necessary to provide access to the towers on the west side of Harvey Creek (2307+50, 2322+27, 2333+00, and 2370+50) which could be reached from a much shorter and less disruptive new road extending from the Gillespie Creek road (see Figure 14).

The road proposed by the Forest Service from point A to point B would provide through-access for hunters, loggers, and recreationists, encouraging high traffic flows through an important elk security area. Such a road would compromise elk security and hunter opportunity in the area and would pose serious water quality problems for Eight Mile Creek. The proposed road would enhance the economic value of a timber sale proposed for 1985.

One possible road system that would provide access to towers with fewer miles of roads is shown in Figure 14. This alternative differs from the Forest Service proposal only in regard to the proposed road from point A to point B, which is not necessary.

Brewster/Tyler and Lodgepole Saddles

The Forest Service identified the Brewster/Tyler Saddle in the vicinity of towers 2512 and 2530 (Figure 15) as key habitat for elk, moose, and deer. A January 11, 1983 memo from Missoula District Ranger Fred Trevey to the Forest Supervisor said:

North Fork of Brewster-Tower access to 2512 and 2530: The primary concern for this area is the key big game habitat for elk, moose and deer, and the effects of roads on hunting opportunity and quality. The original alternative accessed the towers with a new road off the main Gillespie road. This road would significantly increase the hunting pressure in this area and the road would decrease the overall habitat quality by impacting key travel routes and the ridgetop habitat. The revised alternative accesses the area from an existing road system and will not significantly increase hunting pressure. Less ridgetop area and fewer wildlife travel routes are affected. This alternative requires an additional 1200 feet of road, but is more compatible with future resource access needs.

Examination of the access road changes suggested by the Forest Service does not show that the suggested changes would reduce impacts to big game. The roads proposed by the Forest Service (17883 and 17882 of Figure 15) cross a considerable area of uncut timber, important for hiding cover and security for animals moving across the Brewster/Tyler Saddle.

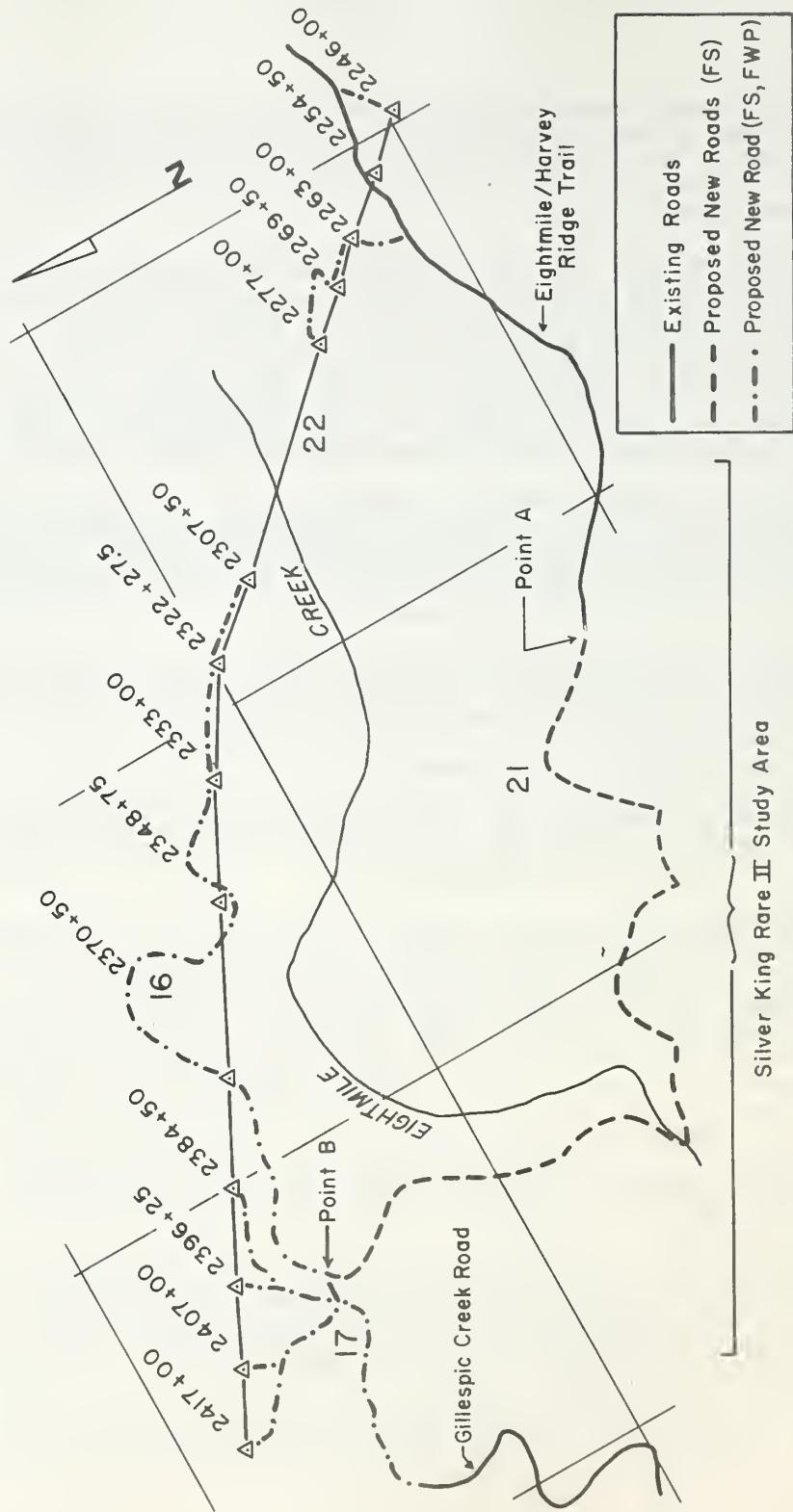


FIGURE 14. PROPOSED ACCESS ROADS IN THE EIGHT MILE/HARVEY CREEK AREA

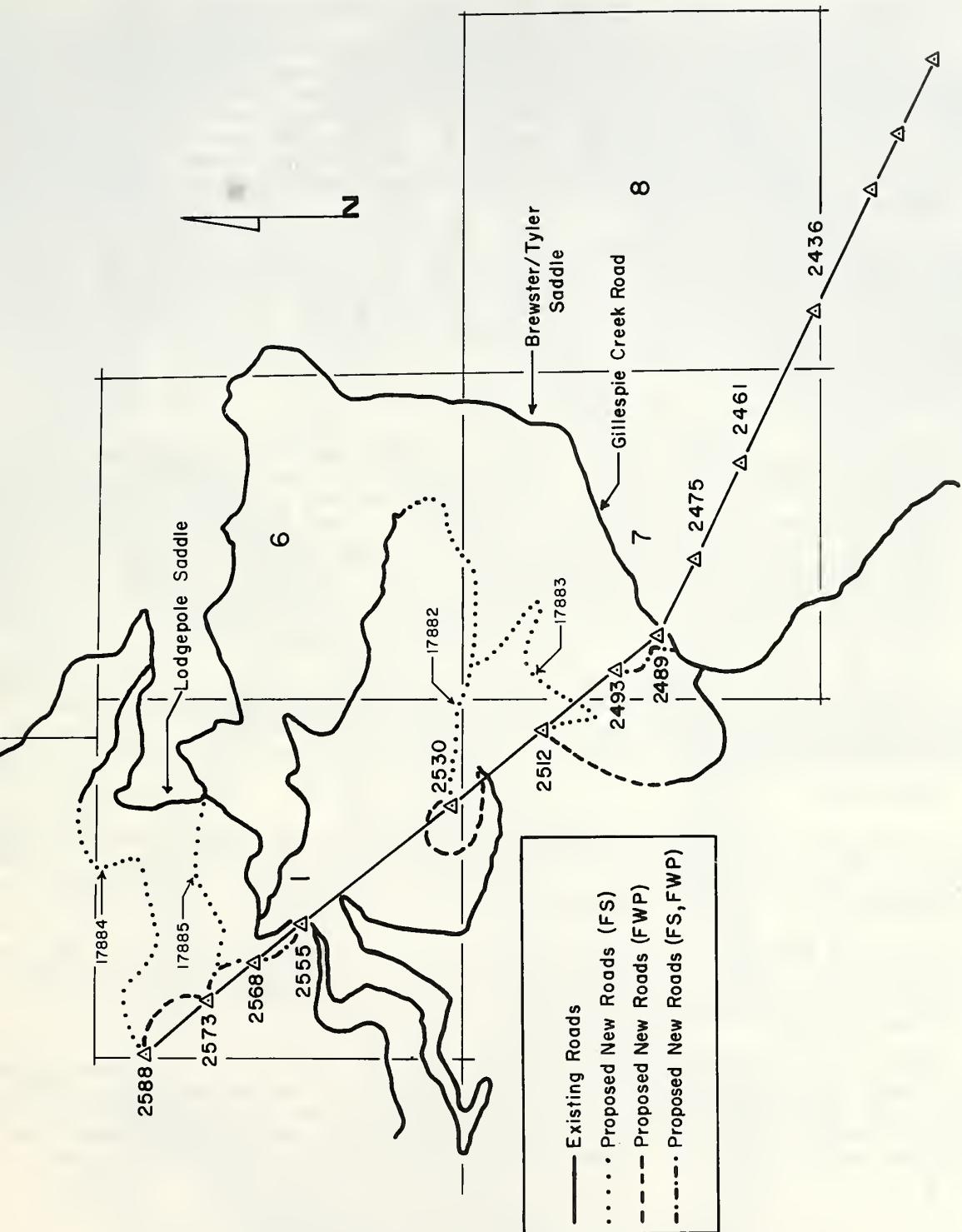


FIGURE 15. PROPOSED ACCESS ROADS IN THE TYLER BREWSTER-LODGE POLE 3 SADDLES AREA

In order to prevent the intrusion of new roads (17882 and 17883) on the existing uncut forest, possible alternative road locations are suggested in Figure 15. It appears feasible to provide access to tower 2512 from a clearcut and spur road off the Gillespie Creek Road rather than constructing more than a mile of road from the north as the Forest Service proposed (see Figure 15). Similarly, tower 2530 possibly could be reached from an existing road that crosses the right-of-way between towers 2512 and 2530. If there are engineering problems (e.g., steep slopes or unstable soils) that would prevent access to tower 2530 from the existing road, BPA could consider using spanning and/or use of helicopters in construction to eliminate tower 2530.

The roads the Forest Service proposed on the Lodgepole Saddle (17884 and 17885 of Figure 15) pose problems nearly identical to the proposed roads on the Brewster/Tyler Saddle. These proposed roads cross extremely important cover for big game movement across the saddle. It appears feasible to reach towers 2568, 2573, and 2588 from an existing road at tower 2555 (Figure 15) by closely paralleling the right-of-way. The terrain between towers 2588 and 2555 appears relatively gentle with no apparent engineering constraints.

West Mountain Creek

The Forest Service identified the headwaters of Adams Creek, West Mountain Creek, and the South Fork of Nemote Creek as posing hydrological and soil problems for road construction. The eastern part of the West Mountain Creek drainage also was identified as important big game habitat. Despite the serious environmental problems posed by terrain along West Mountain Creek and the South Fork of Nemote Creek, the Forest Service proposed construction of several miles of road that do not appear necessary for construction and maintenance of the transmission line. Roads 5471, 18055, 18056, and 18057 (Figure 16) cross unroaded areas and appear to be designed primarily to provide access to the West Mountain and Stark-Remick timber sales, which are scheduled for sale in fiscal year 1988.

Although the existing road up West Mountain Creek extends to the right-of-way, the Forest Service did not propose its use to reach towers. Towers 12 through 16 could possibly be reached by construction of short new roads extending from the West Mountain Creek road rather than constructing several miles of road through the headwaters of several streams (see Figure 16).

Other Areas

Other areas of concern with respect to wildlife and fisheries are: 1) The Osborne Fault area (Savanac, Twin, Rock, and Timber Creek) between angle point 35 and 37; 2) The St. Regis crossing of the Clark Fork; 3) Randolph Creek - Construction and operation of the Taft Substation and reconstruction of the road to the substation.

DFWP has submitted a draft monitoring proposal to DNRC to address some concerns relative to fisheries and water quality in the Osborne Fault area and Randolph Creek (see Appendix A). DFWP is presently studying the proposed locations of towers and roads in the Osborne Fault area to determine whether relocation should be suggested to mitigate impacts.

BPA's preferred alignment at the Clark Fork crossing and to the east of St. Regis poses serious road construction problems because of steep slopes. The area east of the crossing (Sections 14 and 15) is unroaded and provides important big game habitat. Although tower and road locations have not yet been specified in the areas, a recent helicopter reconnaissance provided a view of flagged tower locations, many of which are on very steep slopes, which could result in serious erosion problems.

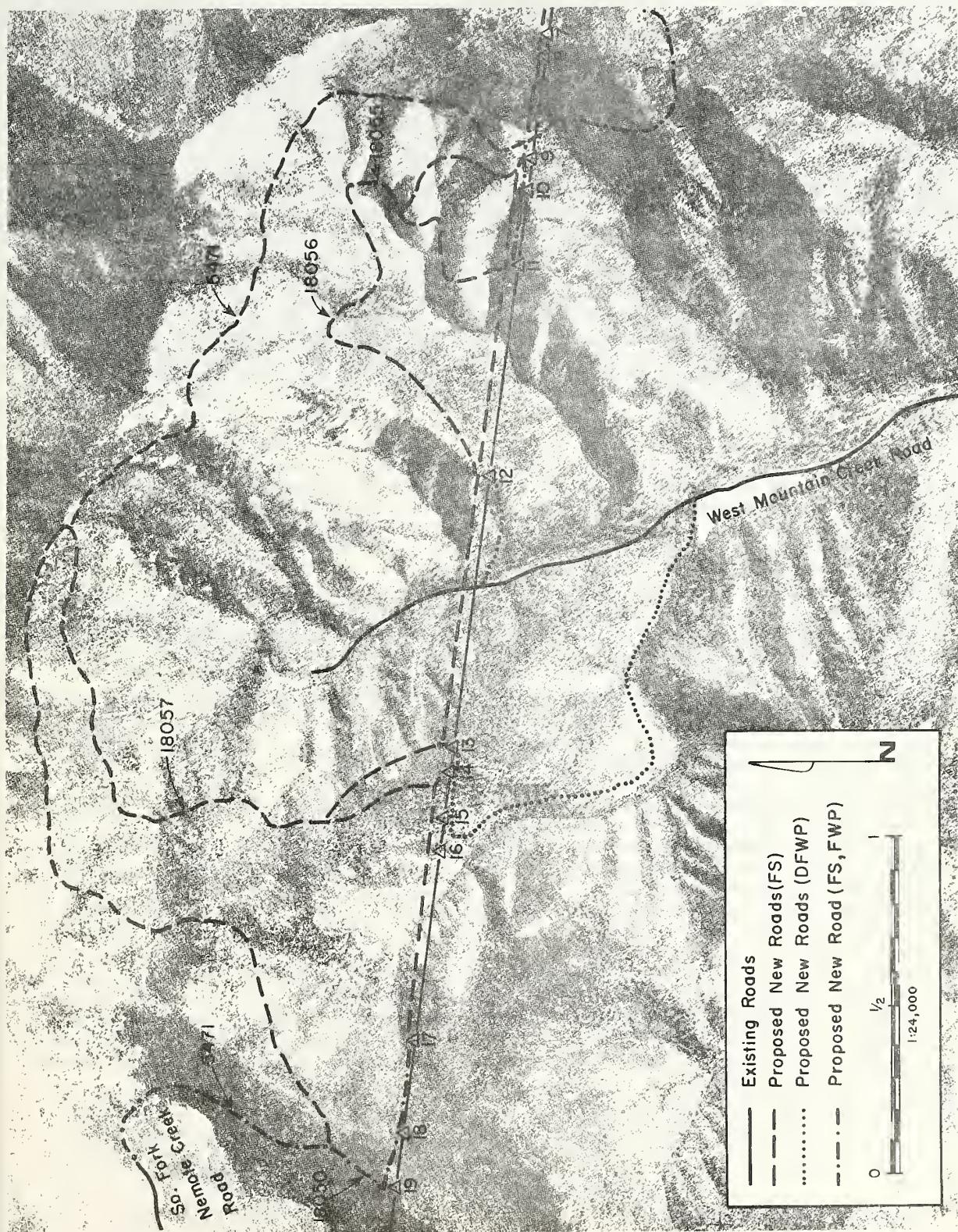


FIGURE 16. PROPOSED ACCESS ROADS FOR THE
WEST MOUNTAIN CREEK AREA

The originally proposed Clark Fork crossing near Mill Creek would be much better in terms of reduced impact to big game security and would reduce the amount of new road construction. The original crossing, however, does create visual problems at an important fishing access site on the Clark Fork.

Conclusions

In conclusion, the suggested road relocations noted so far would reduce the proposed road system by approximately 13 miles. This concession to wildlife represents a small portion of the proposed road system being designed by the Forest Service for BPA. These changes have so far been resisted by Forest Service planners because of proposed timber sales scheduled in the areas. Throughout the joint corridor selection process, all parties agreed that impacts on wildlife for the preferred route would be significant and would require extensive mitigation efforts. At this writing, effective mitigation or commitment to mitigating measures has not been agreed upon by state and federal agencies. DNRC recommends a continued centerline effort and adoption of specific mitigation plans to address the impacts to fish and wildlife posed by the 500-kV line. A plan suggested by DFWP and DNRC to address fish and wildlife impacts is found in Appendix A.

RARE II UPDATE

In 1979 the U.S. Forest Service culminated its roadless area review and evaluation (RARE II) with a final EIS recommending to Congress that roadless areas in National Forests be separated into three categories: (1) wilderness areas, (2) areas allocated to other uses, and (3) lands needing further study. The DNRC siting methodology addressed roadless areas, recognizing that adverse impacts would result if the transmission line crossed undeveloped land.

In Montana the preferred Taft South route crosses five RARE II areas, all of which were allocated for nonwilderness use. The Taft North route crosses four of these. The Plains route crosses another one north of Siegel Pass, and all of the routes cross one RARE II in Idaho. The Hot Springs and Jocko routes do not cross any RARE II areas in Montana.

A recent appeals court decision (California V. Block) made it uncertain whether RARE II lands can legally be released for nonwilderness management. This report provides background on RARE II, the court decision, the RARE II areas crossed by the proposed route, and possible implications of Board approval of a route across them.

The Rare II Process and Court Decision

In 1979, the State of California sued the Forest Service (California V. Bergland) claiming the RARE II process was inadequate under the National Environmental Policy Act (NEPA) regarding the release for nonwilderness uses of 46 RARE II areas in California. In 1980, the U.S. District Court for the Eastern District of California agreed, saying that adequate analysis for the 46 released areas had not been conducted. The court prohibited activities in those areas until an adequate environmental impact statement was prepared. In 1982, the U.S. Court of Appeals for the Ninth Circuit upheld the decision. The court ruled that a site-specific analysis had not been conducted for the 46 areas. It also agreed that the Forest Service had not considered an adequate range of alternative allocations, and that the public had not been given adequate opportunity to comment on the proposed action. Although the California appeals decision (California V. Block) applied only to 46 California RARE II areas, it sets a precedent for areas under jurisdiction of the Ninth Circuit (which includes Montana), and the rest of the country.

In February 1983, the Forest Service "reluctantly" initiated another review of roadless areas (USDA 1983). The criteria to be used for the review are being developed. On March 10, 1983, the Forest Service issued guidelines for interim management of RARE II areas. In Montana and elsewhere, the Forest Service will continue with activities planned for the RARE II areas set aside for nonwilderness uses unless stopped by appeal to the Forest Service. In the event of an appeal, based on California v. Block, the intended action probably would be delayed either until legislation were enacted, or the new forest planning process completed. Appendix B contains a letter from Region One of the Forest Service summarizing the agency's stand on RARE II and its applicability to transmission line siting.

Legislation has passed in Congress determining that the RARE II process is sufficient for some states. This legislation was introduced by one or more of those states' congressional delegates requesting that RARE II be designated sufficient for that state. Although this has not yet happened for Montana, a legislative solution including sufficiency is being pursued. For example, on March 26, 1983, the Montana Wilderness Association (MWA) met with Senator Baucus to discuss legislation that would recommend some areas for wilderness, release others, and designate the RARE II process sufficient for Montana.

Effects on Transmission Line Siting

The transmission line would not conflict with the Forest Service's proposed management plans for the five RARE II areas potentially affected by the transmission lines, and to date no one has contested allocation of these areas to nonwilderness uses.

In May 1983, BPA, the Forest Service, and the Bureau of Land Management are scheduled to issue a joint Record of Decision designating a route for the transmission line. If the federal Record of Decision approves the Taft South route, crossing of the RARE II areas would have been approved by the Forest Service. At that time, any individual or group could appeal to the Forest Service on the basis of the California decision. Before the Forest Service could rule on such an appeal, it would have to complete its planned overall evaluation of all the RARE II areas (which could take a year or more) or RARE II legislation including sufficiency for Montana would have to be passed by Congress.

If an appeal were filed on one or more of the five areas on Taft South, transmission line-related activities could not take place there. However, it is unclear whether construction or other activities outside the RARE II areas would have to be delayed. If the Forest Service evaluation or a RARE II legislative package did recommend wilderness status for one or more of the RARE II areas that were appealed, either the line would have to avoid the area, or a new route selection would have to be made.

Currently, the Forest Service, MWA, and Governor Schwinden favor a legislative solution. In a letter sent to the Montana Congressional delegation Governor Schwinden said:

Most Montanans want to see the RARE II process concluded and prefer to avoid a RARE III. My staff and the Forest Resource Committee are available to assist you and your staff in developing the language, defining the deserving areas and promoting broad-based support for an omnibus wilderness bill.

But development of such a bill that would be acceptable to most Montanans could take some time, and RARE II legislation including sufficiency may not be enacted before the Board or federal agencies issue their Records of Decision. Appendix B contains the full text of the Governor's letter to the delegation, and a similar letter written in 1982.

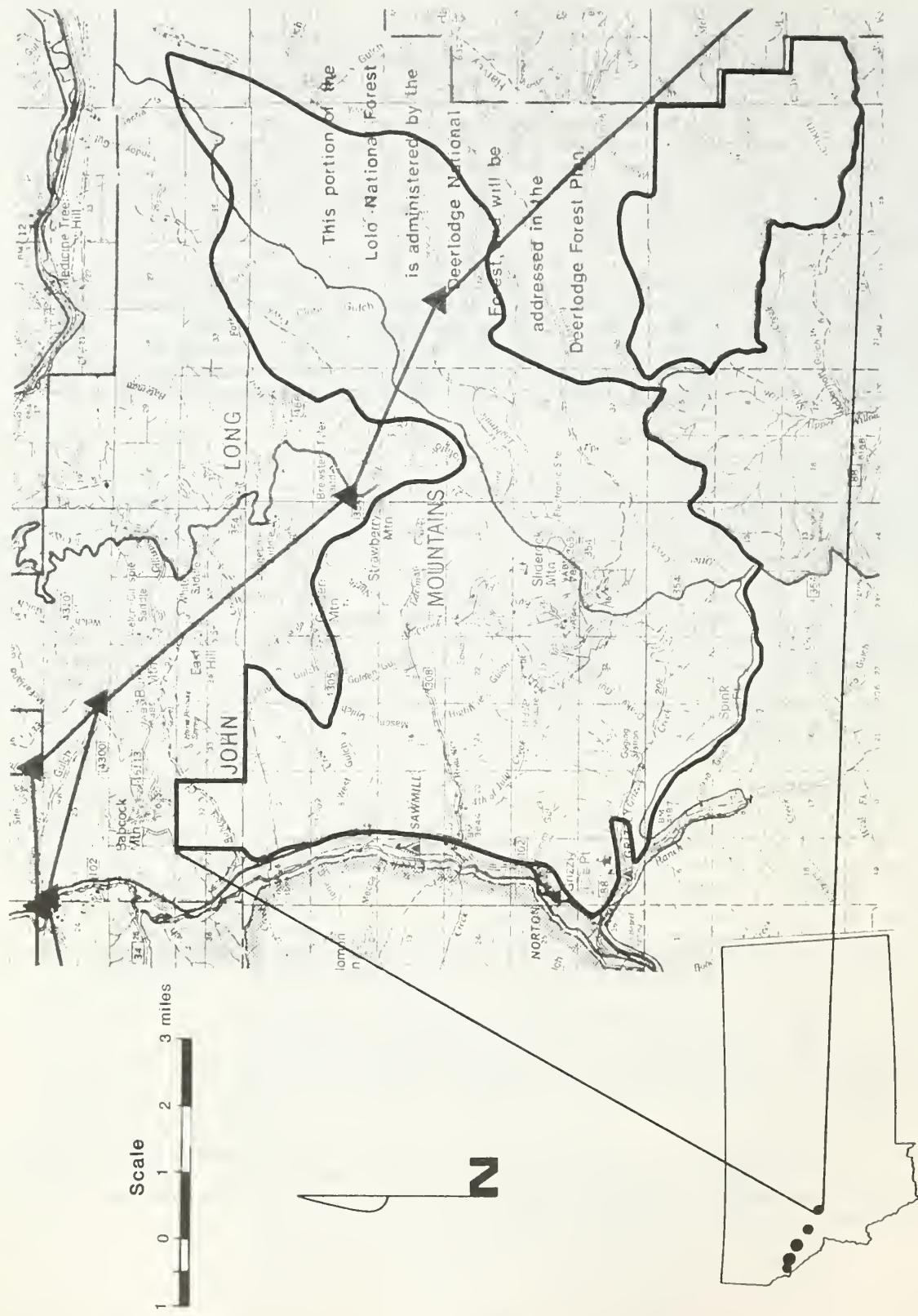


FIGURE 17. THE SILVER KING RARE II AREA

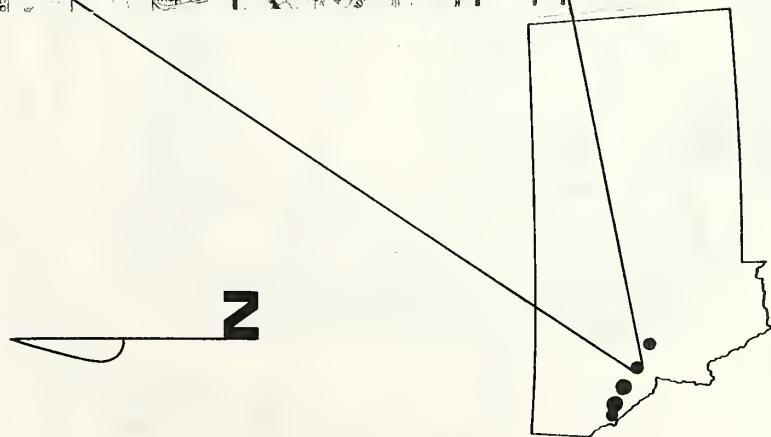
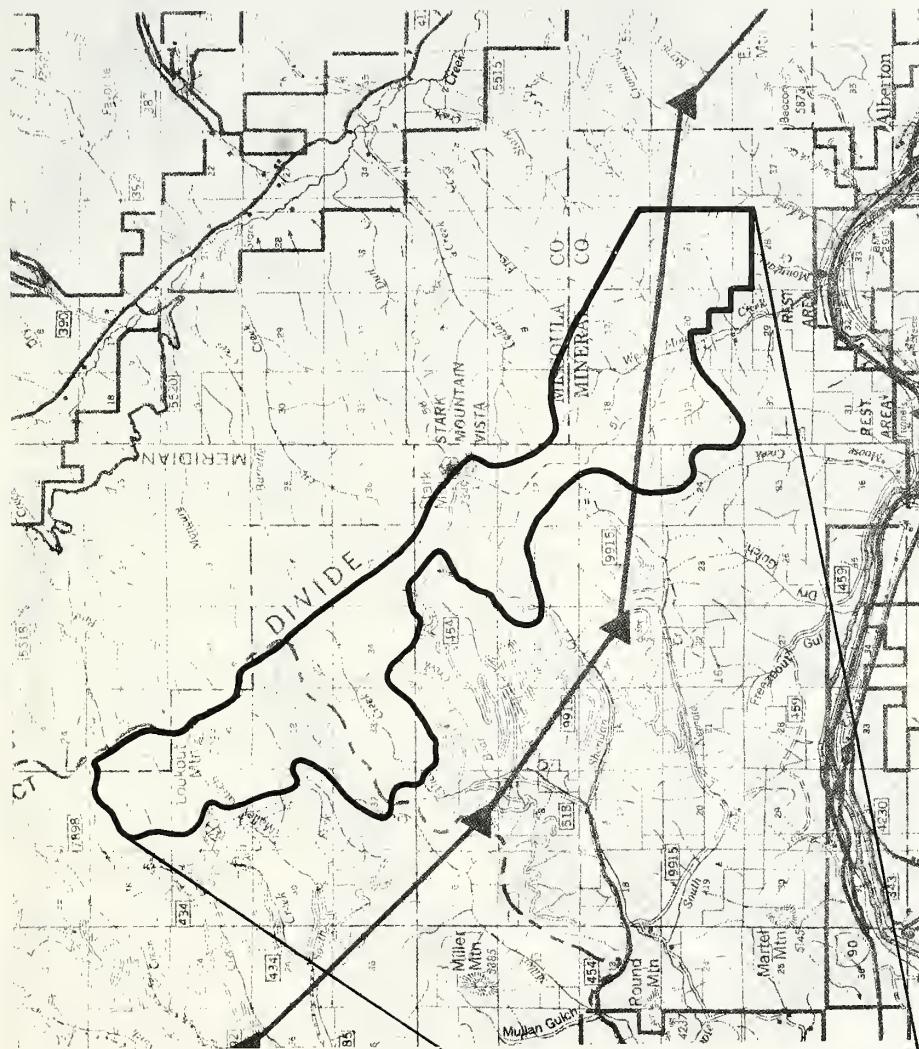


FIGURE 18. THE STARK MOUNTAIN RARE II AREA

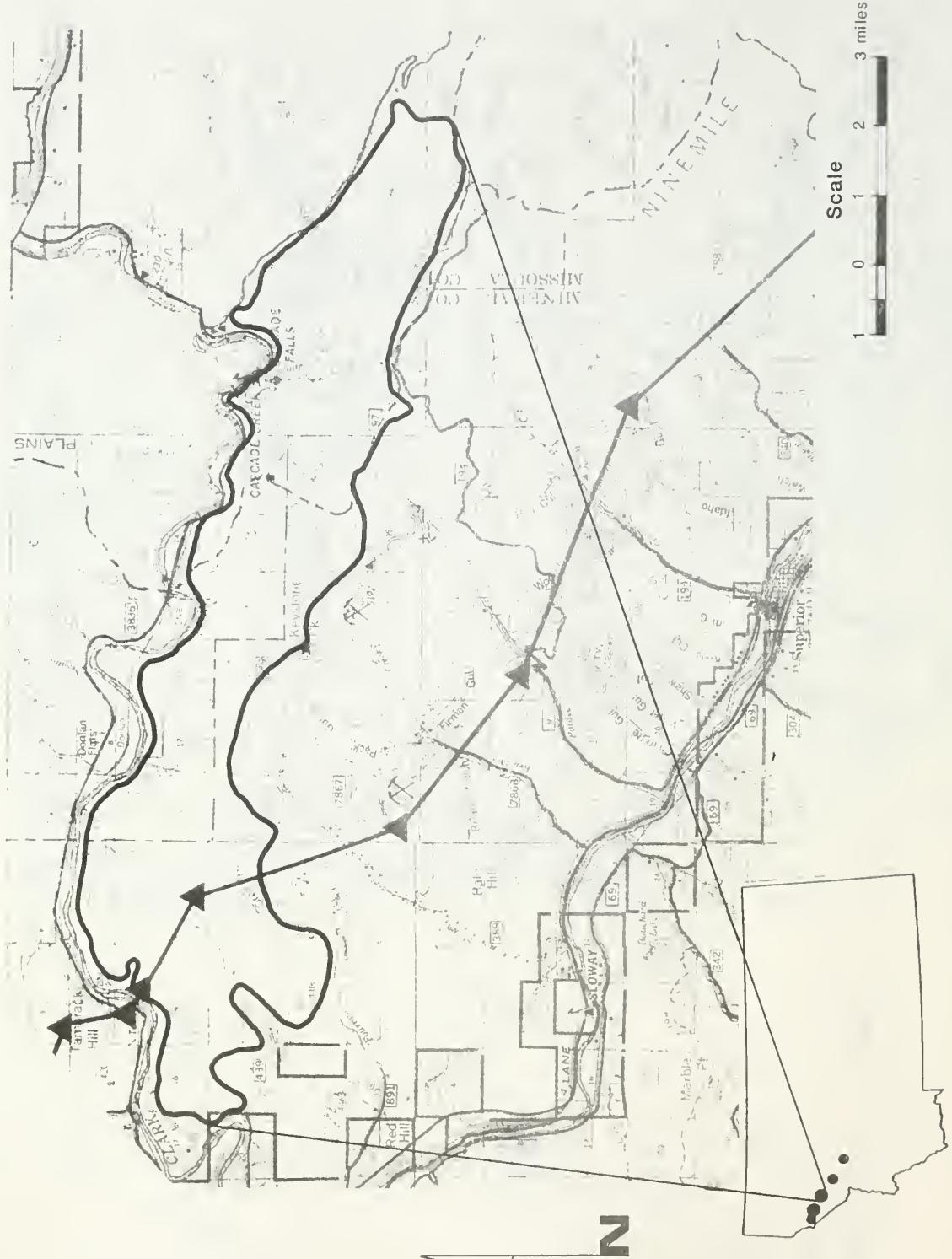


FIGURE 19. THE S. SIEGEL S-CUTOFF RARE II AREA

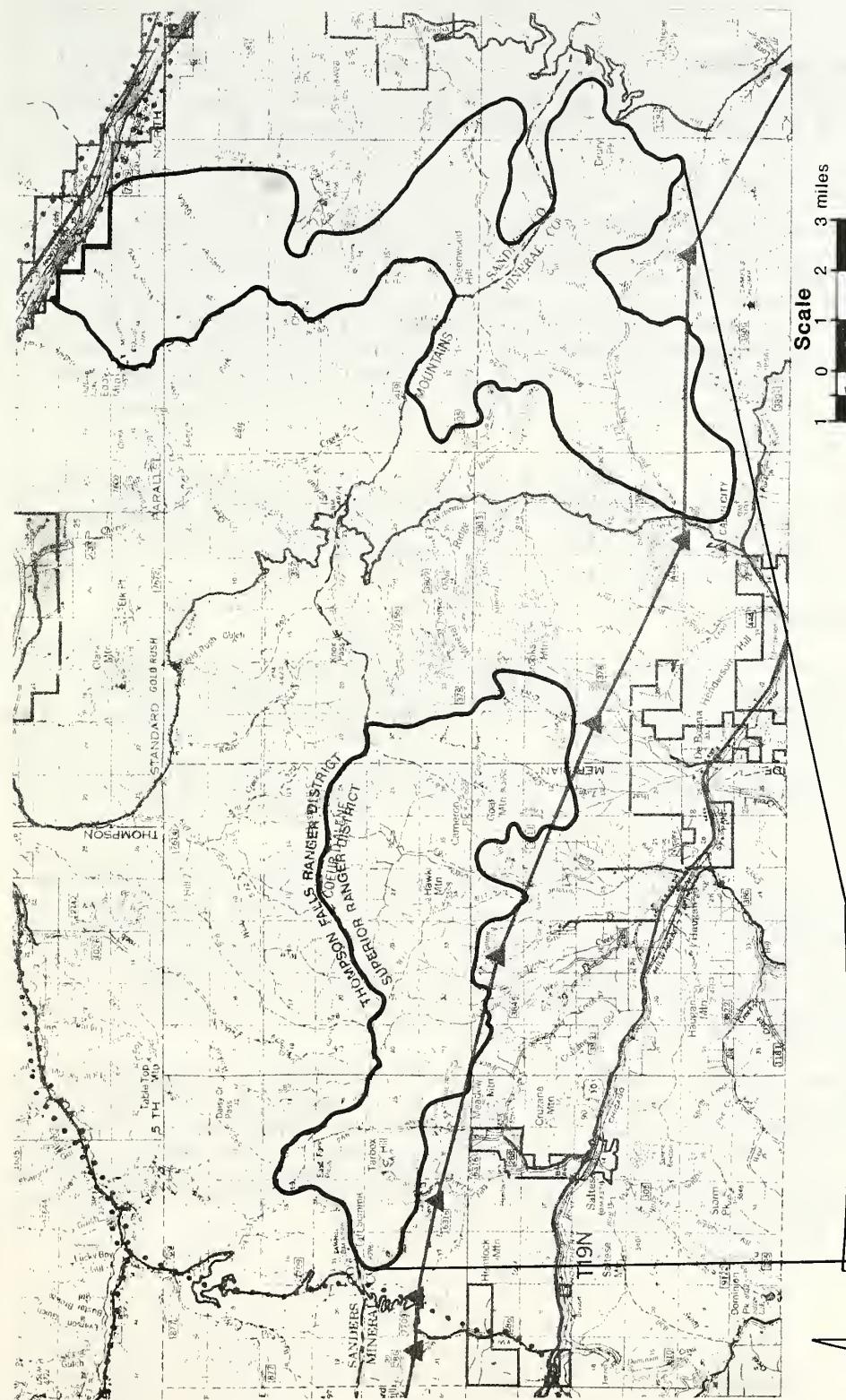
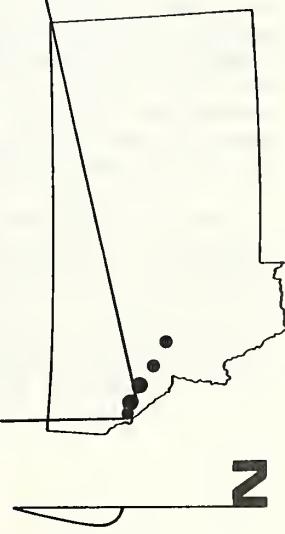


FIGURE 20. THE CHERRY PEAK AND MT. BUSHNELL RARE II AREAS



Rare II Areas Along the Taft Route

The preferred Taft South route crosses five RARE II areas in Montana. Figures 17, 18, 19, and 20 show these areas and the location of the route through them (see Appendix B).

Conclusion

The Forest Service reevaluation of RARE II areas will not be complete for at least a year, and although progress is being made, RARE II legislation including sufficiency may not be enacted by the time the Board or federal agencies issue a Record of Decision. An appeal based on California v Block, could delay the project, at least in one or more of the RARE II areas. Some RARE II areas could not be avoided by centerline relocation, or by selecting Taft North instead of Taft South. If the Board approves the environmentally preferred Taft South route, it would be with the risk that work on the entire project or, more likely, work in one or more of the RARE II areas could be delayed.

AERONAUTICAL CONCERN

Transmission lines are difficult to see from the air and can pose a danger to aircraft. The use of nonreflecting conductors and darkened towers further reduces the visibility of transmission lines. Nationwide, there are about 200 reports yearly of aircraft colliding with transmission lines, radio towers and guy wires (NTSB 1983).

Aeronautical Hazard Markings

Montana has no standards for marking aviation hazards other than those required by the Federal Aeronautics Administration (FAA) which are reprinted in Appendix C. However, the Aeronautics Division of the Montana Department of Commerce has recommended additional marking to make BPA's lines more visible and less hazardous in several locations. The Aeronautics Division recommends that wires crossing a flight corridor be no more than 200 ft above ground level (AGL), that towers be painted red and white in valleys used as flight corridors, and that 54 inch marker balls be installed on wires in these locations. Their recommendations are shown in Table 7.

These recommendations differ from BPA's proposal in several respects. As currently proposed, static wires would be higher than 200 feet AGL in four areas of concern: the Bitterroot River crossing near Miller Creek, the Clark Fork crossings near St. Regis and Alberton, and the Rock Creek crossing. BPA is examining methods to lower the static wires and conductors at these locations. This may require additional towers, relocating existing towers, or allowing the lines to sag lower than presently planned. Lowering the lines is limited by the need to maintain 33 feet of ground clearance under the lowest conductor (Lee et. al 1982) and would require dead end towers on either end of the sag to support the conductors and marker balls on the static wire.

BPA's proposal did not include installation of 54 inch ball markers as recommended by the Aeronautics Division and technical questions still remain over the spacing of the markers and the practicality of installing them. Ball markers are usually installed on the static wire. By attaching 54 inch markers to the two static wires at 400 foot intervals and staggering the markers, a 200 foot effective spacing can be obtained rather than the 150 foot spacing found in the FAA specifications. A heavier than normal tower design may be required for extra support to counter strong winds and ice or frost build-up on the markers and conductors.

TABLE 7. AERONAUTICAL HAZARD MARKING PROPOSED BY THE MONTANA AERONAUTICS DIVISION

Across I-90 east of Alberton:

Maximum height of 200 ft above ground level (AGL) for any transmission lines;
All towers on the valley floor and at each end of spans across the
valley floor to be painted aviation red and white;
54-inch ball markers for lines between marked towers;
Red obstruction lights on top of each painted tower.

Clark Fork crossing between St. Regis and Plains:

Maximum height of 200 ft. AGL of any lines;
All towers between and those on each side of the highway, railroad
tracks and river to be painted aviation red and white;
Ball markers of 54 inches be used for lines between marked towers;
Red obstruction lights on top of each painted tower.

Bitterroot River Crossing near Miller Creek:

Maximum height of 200 ft. AGL of any lines;
All towers on the valley floor and on each side of the highway and
Bitterroot River to be painted aviation red and white;
Ball markers of 54 inches be used for lines between marked towers;
Red obstruction lights be placed on top of each painted tower.

Flint Creek (north of Maxville approx. 1/2 mile - alignment A or AA):

Maximum height AGL of any lines - 200 ft;
Towers on each side of the highway to be painted aviation red and white;
Ball markers of 54 inches be used for lines spanning highway.

Flint Creek (south of Maxville approx. 2 miles - alignment AB):

The same recommendations would apply to this crossing as for the
alignment A or AA Flint Creek crossing located north of Maxville.

Boulder Creek crossing east of Maxville (AB alignment):

A long, high span has been examined by BPA to cross Boulder Creek.
NO LONG, HIGH SPAN should be constructed due to the hazard to aerial navigation.
If this route is chosen, it is recommended:
Maximum height AGL of any lines - 200 ft;
All towers on the valley floor be painted aviation red and white;
54 inch ball markers be used for lines between marked towers.

Clark Fork River crossing west of Garrison and north of BPA substation
(Taft North route):

Same recommendations as for Clark Fork crossing near Alberton.

Clark Fork crossing east of Clinton (Taft North route):

Same recommendations as for Clark Fork crossing near Alberton.

Static wires would be omitted at Rock Creek in order to reduce the height of the aviation hazard. Lacking static wires, it may be possible to install 54-inch markers on the conductors, although there are some questions regarding the feasibility of this (Eddy 1983).

The areas where aeronautical markings are recommended are near heavily traveled highways, residential areas, and recreational rivers where visual impacts would be high. Until the Aeronautics Division's recommendations were received, both DNRC and BPA anticipated using darkened towers to reduce impacts to viewers. The effort to minimize visual impacts of this line is in direct conflict with the desire to increase line visibility for aeronautical safety.

DNRC generally supports Aeronautics' recommendations to the Board in this report, but further recommends that for all crossings in Table 7 there should be a centerline review by DNRC, the Aeronautics Division, and BPA to determine the best way to reconcile these concerns.

PARALLELING

The Board of Natural Resources and Conservation has a policy supporting use of existing utility corridors to site new facilities where possible (BNRC 1973). This use of a corridor for more than one facility is called "paralleling." Paralleling usually means placement of linear facilities such as transmission lines in adjacent or less often in shared right-of-ways. The Board's policy on paralleling reflects the concern of state government and the public regarding the impacts that result when new corridors are opened.

Advantages of Paralleling

In certain situations, paralleling can reduce the environmental and economic impacts of building a new transmission line. Access requirements for a new line paralleling an existing line can be less because access roads can be shared. Paralleling prevents (or at least delays) the need to open a new corridor through undeveloped land. Frequently, a new line in an existing right-of-way requires little or no additional clearing, and much less reclamation effort may be required. Construction and maintenance costs for new lines parallel to existing lines can be lower because of less new access required and shared surveillance of lines. Paralleling the existing BPA 230-kV line from Garrison to Hot Springs, for example, would allow use of vacant right-of-way owned by BPA and would minimize land acquisition costs.

Disadvantages of Paralleling

Part of the problem with paralleling is that most utility corridors in western Montana are located in river valleys and low mountain passes, to make construction as easy and economical as possible. In many cases, corridor selection included little concern for potential environmental impacts and often occurred many years before passage of environmental or siting laws. The addition of the much larger 500-kV lines to a setting already affected by smaller lines could vastly increase the existing impacts. Furthermore, land that may have posed few constraints many years ago when the Clark Fork corridor was established now is subject to a variety of uses, many of which would be affected by a 500-kV line.

Valleys support the most productive agricultural land in the state and farmers and ranchers are concerned about the effects the line would have on land productivity and future uses such as expansion of irrigation systems. Valley land in western Montana is predominantly privately owned and comprises a large part of the taxable base of counties. Many landowners along the existing corridor in the Clark Fork valley pointed out that their land already is crossed by various facilities including railroads, powerlines, and pipelines, and said they had sacrificed enough.

TABLE 8. ROUTES AND SEGMENTS THAT PARALLEL EXISTING TRANSMISSION LINES

Route	Length of Route (in miles)	Paralleling (in miles)	Segments (see Map ____)	Existing Structures
Jocko		6.8 14.2 89.6 12.9 21.3 33.0	101 5A 5B 16 18 22A	161-kV 2 230-kV wood 230-kV wood 2 230-kV steel 500-kV steel 2 230-kV steel 500-kV steel 500-kV steel
TOTAL	171.4	165.8		
Hot Springs		6.8 2.2 4.8 8.2 2.4 7.9 3.5 5.8 50.6 12.9 21.3 33.0	101 108 109 110 111 115 116 117 5 16 18 22A	161-kV wood 161-kV wood 161-kV wood 161-kV wood 161-kV wood 161-kV wood 230-kV steel 230-kV steel 2 161-kV wood 230-kV wood 2 230-kV steel 500-kV steel 2 230-kV steel 500-kV steel 500-kV steel
TOTAL	171.4	147.4		
Plains North (new corridor from Clinton to Plains Substation)		6.8 2.2 9.8 21.3 33.0	101 108 121 18 22A	161-kV wood 161-kV wood 230-kV steel 161-kV wood 100-kV wood 230-kV steel 500-kV steel 500-kV steel
TOTAL	173.4	73.1		
Plains South (new corridor to Plains Substation)		21.3 33.0	18 22A	230-kV steel 500-kV steel 500-kV steel
TOTAL	171.7	42.3		
Taft North (new corridor from Clinton to MT border)		6.8 2.2 9.8 18.8	101 108 121 ---	161-kV wood 161-kV wood 230-kV steel 161-kV wood 100-kV wood
TOTAL	158.3	18.8		
Taft South (all new corridor)	156.6	-0-	---	---

Paralleling Options

BPA originally proposed route segments paralleling existing transmission lines in the Clark Fork valley. Table 8 lists the route segments where existing transmission lines could be paralleled. Public opposition led BPA to develop route segments that did not parallel existing lines.

BPA and DNRC Study of Paralleling Options

As shown in Table 8, the Hot Springs and Jocko routes offer the most opportunity to parallel while Taft and Plains routes offer the least. The Taft South route would open a new corridor from Garrison to the Idaho border and Taft North would have a similar effect from Clinton to the Idaho border. The public argued against many of the routes that parallel existing lines, citing incompatibility of the line in residential areas, concern over possible health effects, loss of tax base, and a preference that the lines be placed on public land.

The areas along the Clark Fork valley that might be suitable for paralleling, especially between Clinton and Missoula, north of Missoula in Grant, Butler, LaValle and Rattlesnake creeks and in the towns of Alberton and Frenchtown, have experienced residential and agricultural development that would be in direct conflict with a 500-kV transmission line. The same is true of corridors passing through Arlee and Evaro, and between Hot Springs and Thompson Falls. On the Jocko Route the line would conflict with intensively used recreation areas near Ovando and at Salmon and Placid lakes and residential development associated with recreational use of these areas. This route would also affect the Jocko River Tribal Primitive Area which was designated after the existing line was built.

In choosing a preferred route, DNRC and BPA recognized strong public concern and gave much weight to social, visual, and recreational concerns. DNRC considered the advantages that paralleling might confer for certain resources, but found that most existing corridors cross areas where a 500-kV line would conflict with current land uses. The weight accorded to social, visual, and recreation resources favored segments and routes away from people and their activities, precluding most opportunities for paralleling.

In summary, paralleling of existing facilities with this line would place the line closer to more people than would the opening of a new corridor. Given great public concern, DNRC did not feel the advantages of routes that conformed to the Board's policy outweighed the disadvantages.

SITING PREFERENCE — PUBLIC LAND/PRIVATE LAND

A frequent comment on BPA's draft EIS was that a public project such as this one should be placed on public land. In western Montana, public land is primarily mountainous, while private land and inhabited areas are in the low-lying valleys. Flat valley terrain is usually favored for transmission line construction. However, the presence of human populations in these areas makes it difficult to establish routes that would not adversely affect people.

Routes on more mountainous public land require substantially more miles of access roads and have a greater impact on wildlife, fisheries, timber, and other aspects of the natural environment. Thus, the trade-off between public and private land roughly corresponds to a trade-off between impacts on residential and agricultural land use vs. impacts to wildlife, fisheries, timber production and the natural environment.

PAYMENT-IN-LIEU-OF-TAXES

BPA is a federal agency and therefore pays no taxes to local governments or the state. One of the prominent public concerns has been "foregone taxes" for counties crossed by the line that would have received tax payments if the line had been built by the Montana Power Company. BPA's draft EIS contained an estimate of the amount of "foregone taxes." The estimate for the first year ranged from \$375,000 for Powell County to \$2.6 million for Mineral County. Perhaps more important from the local government point of view is the percentage of the county's taxable base that the line would represent if it were built by a private utility. For Mineral County which has only 18 percent of its land base in private ownership, the foregone taxes would represent a 77 percent increase in tax receipts over 1979 levels (BPA 1982).

Senator Max Baucus is planning to introduce legislation requiring BPA to make payments in lieu of taxes. Baucus's office expected the legislation to be introduced in early April.

There is strong opposition to in-lieu tax payments in Congress because states such as Washington and Oregon, which have numerous public utilities, see it as a first step toward requiring public utilities to pay taxes, which would raise utility rates. Opposition has been strong in the past, suggesting that the chances of passing any such legislation are remote.

House Bill 747 was introduced in Montana's 1983 Legislature that would enable the State Department of Revenue to assess a beneficial use tax on private utilities transmitting power on tax-exempt federal agency lines, such as BPA or Western Area Power Administration (WAPA). Utilities would be required to report to the Department of Revenue the value of the power being transmitted and the percent of time the lines were used. The Department of Revenue has not levied a beneficial use tax on utilities using tax exempt federal transmission lines in the past because it had no mechanism in law or rules to collect the information that would allow it to assess the value of the power transmitted. HB 747 provides a mechanism by requiring the utilities to report the value of power transmitted through lines over 200-kV. BPA and WAPA 230-kV lines and BPA's Hot Springs-Dworshak and Townsend to Taft 500-kV line would be covered. Ultimately, any beneficial use tax would be paid by the utilities' ratepayers throughout the Pacific Northwest, which would result in proportional distribution of the cost.

If this legislation passes, the Montana Power Company and its partners in Colstrip Units 3 and 4, and any other utilities using the BPA Townsend-to-Taft lines, would pay beneficial use tax to the Department of Revenue, which would distribute it to the appropriate taxing jurisdictions, including the counties crossed by the lines.

At this writing HB 747 had passed both the House and Senate and was sent to the Governor. If HB 747 becomes law, tax receipts will depend on the market value and taxable class of the transmission facilities determined by the Department of Revenue. Assuming the market value for the first year of operation (1986) is the original installed cost of the lines, and the utilities are taxed at their current centrally-assessed class of 15 percent, the first-year tax receipts would be about the same as the "foregone taxes" calculated by BPA. However, if BPA or another tax-exempt utility used the lines (wheeled power over the lines), the value of that use would not be taxed. Thus, tax receipts would be reduced.

An update on the status of this legislation will be provided to the Board at its meeting to consider this document.

CHAPTER TWO -- ELECTRICAL AND BIOLOGICAL EFFECTS

DNRC's draft report described electrical and biological effects caused by high-voltage transmission lines (HVTLS). A short description of these effects is contained in appendix D (Testimony of Paul Stolen). To ensure that people near the transmission lines would not be endangered or needlessly annoyed by these effects, DNRC recommended in its draft report a wider right-of-way than that proposed by BPA. This recommendation was based on information contained in two special studies that were provided to the Board (Sheppard 1983a, ERM, Inc. 1982).

DNRC and BPA disagree over this recommendation. BPA proposed a 125-ft right-of-way, but DNRC suggested in its draft report that a 160-ft right-of-way was necessary in residential and subdividable areas to limit chronic exposures of the public to electrical fields of more than 1 kilovolt per meter (kV/m). Beyond this, if it were deemed necessary to prevent unacceptable nuisance noise impacts, DNRC said in its draft that a 265-ft right-of-way would be required. DNRC estimates that 7 miles of the 168-mile preferred route is residential or subdividable. There are 40-45 miles of private land on the Taft South route, depending on centerline location.

Most of the comments on DNRC's recommendation on electrical and biological effects were submitted by BPA in the form of testimony and a new section in BPA's final EIS on Garrison West. This chapter contains DNRC's response to BPA's comments, and also contains public comments on this issue. Other comments and responses on DNRC's draft report are found in Chapter 3. Estimates of potential noise impacts have been revised downward because of more detailed weather data provided by BPA.

DNRC's recommendation of a wider ROW than is proposed by BPA is primarily a land use control to prevent construction of residences too close to the right-of-way in the future. The following sections describe transmission line right-of-ways, what factors are used to determine widths, and what restrictions in land use occur in and adjacent to the right-of-way.

Transmission Line Right-of-Way and Adjacent Land Use

An HVTL right-of-way is a strip of land of specified width obtained by easement from private landowners or obtained by lease or grant from public land management agencies. The primary purpose of designating a right-of-way is to safeguard the transmission line by placing use restrictions on the land it passes through. But it is also important to keep in mind that large transmission lines--those over 230 kV--can potentially affect land uses beyond the ROW edge, and utilities must take countermeasures to minimize these effects. For example, mitigation measures may sometimes be necessary to prevent disruption of telephone and railroad systems and may need to be taken up to one mile from a transmission line (Eichin and Harless 1975). For these reasons, it is necessary to describe the engineering and environmental factors that go into selection of a right-of-way width, and what kinds of land use are affected nearby.

Private landowners usually negotiate a monetary settlement for the loss of use rights to their land. If negotiation fails to bring a suitable settlement, condemnation procedures are undertaken, in which case the unwilling landowner is forced to yield the right-of-way, with monetary compensation determined by a judge.

One purpose of the land use restriction in the right-of-way is to prevent objects from being built too close to conductors, which would allow electrical flashover during windy conditions. Standard clearances are described in the National Electric Safety Code (NESC), and design handbooks give clearances or calculation methods for various transmission line designs (EPRI 1982, Farr 1980). Reference to the NESC shows right-of-way widths vary considerably for any given voltage (see also Table 9). Length of span and length of insulator strings are major factors in determining proper right-of-way width because the line must be designed so the conductors remain a safe distance from nearby objects even when conductors swing in high winds. For example, NESC specifies that 345-kV lines must have a minimum clearance of 153 feet from buildings, which would require a right-of-way of 155 ft for a span of 1,000 ft and 200 ft for a 1,400 ft span (Farr 1980).

When a line is built, trees and structures are removed from the right-of-way to achieve at least minimum clearances. Maintenance during operation prevents encroachment. The right-of-way width is selected based on minimum clearance as if a building were present along the right-of-way edge (Farr 1980). Structures are not allowed in the right-of-way, although certain land uses and activities are.

The NESC and conductor clearances describe the minimum right-of-way widths for transmission lines. In most cases, a utility does not concern itself with what occurs beyond the right-of-way edge because, in most situations, there is nothing outside the right-of-way that normally would affect the line. There are exceptions, however, and these blur the significance of the right-of-way edge as the boundary of the utility's land use control. For example, BPA clears "unstable trees" in a 350-foot swath for 500-kV lines in some forests, even though the right-of-way is 125 feet (USDOE 1977).

The higher the voltages, the more likely it is that land use impacts extend beyond the right-of-way edge. For example, BPA's policy for 500-kV is to ground metal-roofed or metal-sided buildings that contain flammable or explosive materials within 250 feet of the outside conductor, and to ground gutters and downspouts on any type of building within 150 feet (Lee et al. 1982).

For voltages 345-kV and above, criteria other than NESC's required clearances enter into selection of a transmission line design. These include limitation of allowable electrical field strength at the edge of the right-of-way and reduction of noise. According to the Electric Power Research Institute (1982), criteria that may be used in planning to select field strength limits include: "induction in objects, induction in people, biological effects, fuel ignition -- road crossing, spark discharges, pole fires, and corona from grounded objects." Regulatory agencies of other states have limited field strengths on the basis of these criteria (Shah 1982).

The above descriptions of right-of-ways and associated land use restrictions have an important relationship to route selection criteria. The higher-voltage lines, and subsequent restrictions that extend beyond the right of way edge, will be more difficult to locate in areas of high-intensity land use (also corresponding to more highly-populated areas); i.e., the bigger the transmission line, the more likely it will be routed in a low-intensity land use area.

The larger a line, the more concerned the public tends to be because of perceived and actual effects from the correspondingly larger and stronger electrical fields. BPA's tally of public comments on the Garrison West project showed the highest number of comments concerned biological/electrical, radio/TV, and noise effects (USDOE 1983).

TABLE 9. ELECTRICAL FIELDS AT RIGHT-OF-WAY EDGE FOR SELECTED AC TRANSMISSION LINES

Transmission line name or type	Right-of-way width (feet)	Maximum electrical field (kV/m) ^d	Locations, configurations, and explanations
500 kV			
Montana Power Company	300 (2 towers)	1.8 - 2.2	*Range due to variation in phase relationship and 2 different tower sizes
Bonneville Power Administration			
Hot Springs-Dworshak	150	1.8 - 2.3	Five delta configurations, variable bundled conductors, variable phase spacing
Hot Springs-Dworshak	150	1.8	Delta configuration, single conductor
Hot Springs-Dworshak	150	3.8	Flat configuration, 1.2 miles only
Hot Springs-Dworshak	150	4.0	Flat configuration, 1.1 miles only
Hot Springs-Dworshak	150	6.4	Flat configuration, 1.2 miles only
Carrison-West, double-circuit	125	1.8	*Preferred Taft route
Carrison-West, single-circuit	105	3.3	*Plains route only
Carrison-West, triple-circuit	135	1.9	*Plains route only
Tennessee Valley Authority			
Original design	200	2.2	Areas served by TVA
Current design	175	2.5	*Current design has closer phase spacing
Western Area Power Administration	175	2.5	California
San Diego Gas & Electric ^a	200	1.5	*California, APS/SDG&E Interconnection Project
345 kV			
Western Area Power Administration			
Older design	150	2.3	Older design has wider phase spacing
Newer design	150	1.8 - 1.9	*Range is due to use of two conductor sizes
230 kV			
Montana Power Company			
Typical wood H-frame	80	1.5	
Typical wood H-frame	100	1.0	
Typical wood H-frame	120	0.7	* [A 100-foot right-of-way is most common, the others are extremes. Newer lines tend to use the 100-foot width
Washington Water Power			
Noxon-Hot Springs	100	1.4	
Noxon-Pine Creek	100	1.4	
Western Area Power Administration			
Fort Peck-Havre ^b	150	0.6	*Proposed rebuild of a 161 kV line
Miles City-Underwood	105	1.4	
Miles City-Custer-Yellowtail	125	1.1	
Bonneville Power Administration			
Anaconda-Hot Springs	125	0.9 - 1.2	Range caused by variations in phase spacing
Conkelly-Flathead	100	1.0 - 2.1	Range caused by variations in phase spacing
Flathead-Hot Springs	125	1.2 - 1.3	Range caused by variations in phase spacing
Anaconda-Silverbow	200	1.4	
Basin Electric			
Standard REA design	125	0.8	*South Dakota, North Dakota, Wyoming
Pacific Gas and Electric			
Castle Rock Junction-Lakeville ^c	100	2.0	Four-circuit, 161 and 230 kV segment through a park (California)
Castle Rock Junction-Lakeville ^c	120	1.1	Four-circuit, 161 and 230 kV through a proposed housing development
161 kV			
Montana Power Company			
Clyde Park-Dillon	40	0.8	*Baxter Lane segment only: double-circuit 161/50 kV with 13 kV distribution underbuild
Typical H-frame	80	0.9	*
Western Area Power Administration			
Fort Peck-Havre-Great Falls	100	0.6	Being replaced by 230 kV line and ROW widened by 50 feet
115 kV			
Western Area Power Administration			
Typical designs	75	0.7	*
Typical designs	85	0.5 - 0.6	*Range is due to the use of 2 different conductor sizes

Source: Dietrich 1983b, 1983c, except as noted.

^a California Public Utilities Commission 1981

^b BPA 1982

^c California Energy Resources and Development Commission 1981

^d Data were obtained from design engineers with the listed companies and agencies. Calculations were made with a computerized program generally accepted as accurately characterizing electric fields, assuming flat terrain and no shielding by vegetation or other objects. Maximum fields do not necessarily occur perpendicular to the lowest part of the span, and maximums were obtained by making calculations at many conductor heights to determine the true maximum.

* Indicates new lines under construction or proposed transmission lines, current design, or most common design.

Electric Fields at the Edge of Transmission Line Right-of-Ways

Table 9 lists electric fields at edge of right-of-way (EoROW) for 115 kV through 500 kV transmission lines in Montana and for federally operated utilities elsewhere. Most of these figures are for lines now operating, though others are projected for lines not yet energized, as noted in the table. The lines represent a wide variety of structural configurations. Table 9 is based on a preliminary review of designs (Dietrich 1983b, 1983c).

DNRC feels that the following general conclusions can be drawn from the information in Table 9 and in Dietrich (1983b, 1983c):

- (1) HVTL's smaller than 230-kV are unlikely to have EoROW fields exceeding 1.0 kV/m
- (2) Newer 230-kV designs such as the Western Area Power Administration's (WAPA) Fort Peck-Havre line (0.6 kV/m), MPC's "most common" 100-ft ROW design (1.0 kV/m), and the present "standard" REA design (0.8 kV/m), tend to have EoROW electrical fields less than 1 kV/m
- (3) Lines of 345-kV and above commonly exceed the 1 kV/m limit (there are no 345-kV lines in Montana, however)
- (4) Newer 500-kV designs--such as those of TVA and San Diego Electric--have weaker EoROW electrical fields than older lines of the same capacity, a trend similar to that of the lower voltage lines
- (5) right-of-way widths and EoROW electrical fields vary widely among transmission lines of similar voltages.

Limitation of the Electrical Field at the edge of the Right-of-way

DNRC's recommendations of a 1 kV/m EoROW limit was based on two characteristics of HVTL electrical fields besides findings of the Sheppard Report: 1) the strength of the field increases exponentially as the transmission line is approached, and 2) the electric field is distorted when a person is in it. Figure 21 is a profile of electrical fields under the lowest part of the span of BPA's proposed 500-kV line measured at the standard 1 meter above ground. The peak occurs under each conductor about 15 feet from the centerline. The range of electrical field strength limits described in the Sheppard Report -- 0.3 kV/m to 3 kV/m -- brackets a distance of 150 feet to 50 feet from centerline. The choice of right-of-way widths based on this criterion thus ranges from 100 feet to 300 feet. The proposed 1 kV/m EoROW limit is seen to occur at a point on the curve representing an electrical field strength such that a more stringent limit would bring diminishing returns, and a less stringent limit would allow greater exposure to the field. The same considerations apply to lower-voltage lines, and perhaps even more so because only a slight expansion of normal right-of-way width would be needed to drop the field below 1 kV/m.

The second characteristic of HVTL electric fields, that the electric field is distorted when a person is in it, also was a factor in DNRC's recommendation of a 1 kV/m limit because it is one of the major causes of uncertainty regarding effects on people. One of the reasons for this is the "scaling" problem, where, as shown in figure 22, electrical field strength depends on body shape, and people are exposed to stronger fields at the top of the body than 4-legged animals. Figure 22 represents how external electrical fields distort and concentrate at the top of people and animals who walk into an electric field comparable to BPA's maximum field of 7.8 kV/m under the lowest part of the span (measured at 1 meter above ground, the standard distance). Electric fields inside the body also are different (and much lower than external fields) for differently shaped bodies. These phenomena make it difficult to determine a correlation between electrical effects on humans and animals. In terms of selecting an electrical field limit, this phenomenon also contributes to a higher electrical field on people.

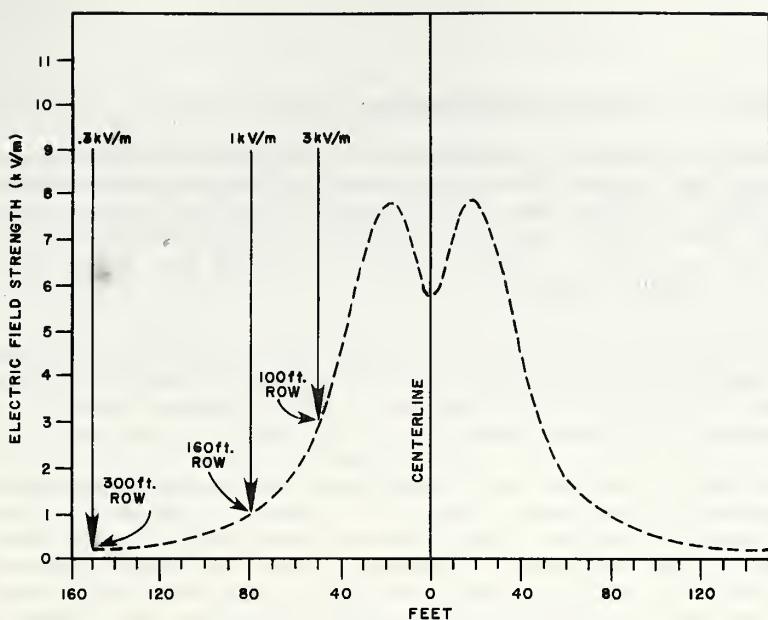


FIGURE 21. CALCULATED ELECTRIC FIELD
STRENGTH IN kV/m AT 1 METER
ABOVE GROUND AT MIOSPAN FOR A
TYPICAL DOUBLE CIRCUIT 500-kV
8PA TRANSMISSION LINE OPERATING
AT 550-kV.

Source: Modified from Lee et al,
1982

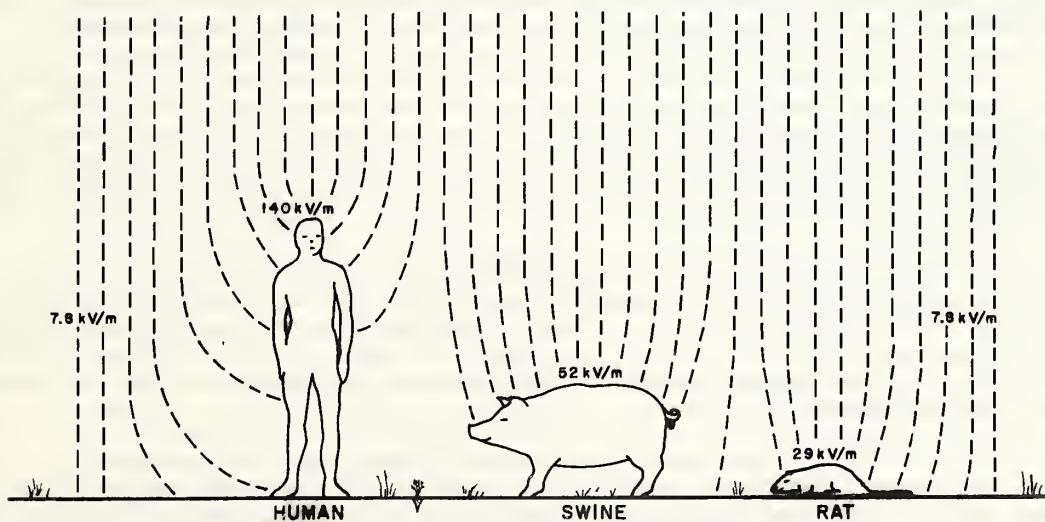


FIGURE 22. LINES OF FORCE IN A 7.8 kV/m
FIELD ARE CONCENTRATED ON UPPER
BODY PARTS WHICH INTENSIFIES THE
ELECTRIC FIELD AT THE BODY
SURFACE (VALUES ABOVE EACH
FIGURE).

Source: Modified from Lee et al,
1982, and Kaune and Phillips
1980.

Acceptable noise level at the edge of the right-of-way

As is described in appendix D, transmission lines cause noise when the line is in corona, which usually occurs during wet weather. There have been cases where transmission line noise has annoyed people living adjacent to a right-of-way to the point that expensive re-conductoring or purchase of property or noise easements was required. For example, BPA replaced some portions of a single-conductor line with quieter conductor bundles in the 1970s (BPA 1983), and BPA will purchase property if noise is a problem (DNRC 1982).

Montana does not have statewide noise limits, but, as noted in the "Comment and Response" section below, Montana cities and towns do have noise ordinances, and the failure of rural jurisdictions to set limits should not be used as an argument against setting a noise limit when a major energy facility is sited in rural areas.

Noise is measured in numerous ways, depending on the purpose. Ldn refers to a weighted average where nighttime is given added weight. BPA's proposed transmission line has a median noise level during foul weather of 56 dBA, at an elevation of 4,000 feet (BPA 1983). When this estimate is adjusted according to the EPA day-night averaging method, and adjusted for a 5 percent rain frequency, it becomes 52 dBA (Ldn) (BPA final EIS). The EPA-recommended noise level in residential areas and farms is 55 kBA (Ldn). DNRC's contractor on noise indicates that transmission line noise is more annoying than noises that were used to develop this recommendation and that it is appropriate to apply a penalty factor of at least 5 dBA to this limit (ERM, Inc. 1982, Dietrich 1983). BPA's proposed transmission line will meet the adjusted limit of 50 dBA (Ldn) at 40 feet from the edge of the 125-ft right-of-way.

DNRC and BPA agree that the transmission line will produce a noise level of 52 dBA (Ldn scale) at the right-of-way edge. A similar noise level for a 765 kV transmission line in New York--53 dBA (Ldn)--resulted in the establishment of a zone 425 ft wide on each side of the 350-ft right-of-way where the NY Public Service Commission reserved the right (for 18 months) to require the utility to purchase houses if noise complaints could not be resolved (Scott-Walton 1979).

New York is the only state with a noise limit specific to transmission lines: "Long-term median foul weather sound level due to the operation of the transmission line is 35 dB(A) in the complainant's regular sleeping room." (Shah and Associates 1982). According to DNRC's study of transmission line noise, this limit would be exceeded by BPA's transmission line at the edge of the right-of-way. The New York limit would be met about 90 feet outside the right-of-way edge (ERM, Inc. 1982).

Twenty-six states have noise control legislation (Shah and Associates 1982). Permissible limits vary from 40 to 70 dBA at the property line. Several states have nighttime limits lower than allowable daytime noise, and BPA's proposed transmission line would exceed these limits at the right-of-way edge during foul weather. For example, Connecticut, Illinois and Oregon have nighttime limits for rural and residential areas of 45 dBA, Minnesota and Maryland 50 dBA, and California 40 dBA (Shah and Associates 1982).

Given that BPA's proposed line would produce significant noise only sporadically, it is difficult to predict impacts. DNRC used the EPA noise guidelines of 50 dBA (Ldn) because of the extensive effort that went into setting the guidelines (Scott-Walton 1979). If the noise limits of other states are used as a guide, the requirement proposed by DNRC--a 205-ft ROW--is a minimum to prevent noise impacts (see next section). According to Scott-Walton (1979), reduction of noise levels by 2-3 decibels accomplishes a noticeable reduction of impact in a marginal noise exposure situation.

Comments and Responses on Health, Biological Effects and Noise

COMMENT: BPA published a comprehensive report for the public on what was known about electrical and biological effects of transmission lines. The report and draft and final impacts statements on the Garrison Spokane 500 kV transmission line adequately cover the topics of concern to DNRC. (BPA testimony and BPA Final EIS)

RESPONSE: DNRC agrees that BPA published a comprehensive report on the general topic of electrical and biological effects of HVTL's, but suggests that this report was not complete because it did not adequately discuss the significance and implications of the research it describes. DNRC, in making determinations regarding public health and safety and other MFSA requirements, specifically requested its contractor to examine the validity, implications, and significance of the aspects of research on ac electrical fields that bear upon such issues as the duration and level of exposure to persons living or working immediately adjacent to the right-of-way.

COMMENT: "The continuing review of information on over 20 years of research from around the world indicates there is no evidence that the electrical effects of 500-kV lines pose a threat to human health....The DNRC analysis as summarized in the draft report also concluded that 500-kV lines have caused no known effects on the health of animals or people." (BPA testimony)

RESPONSE: DNRC's conclusion reported in the second sentence is not the same as BPA's conclusion. Clearly, there is evidence supporting the argument that human health may be adversely affected by electrical fields. The evidence is not yet conclusive and is in the form of: (a) low-level biological effects in laboratory studies of animals ("in vivo") and living tissues ("in vitro") and (b) epidemiological studies of people chronically exposed to electrical fields. Because of constraints on experimentation with humans, there is no way to obtain the direct evidence of harm. DNRC feels that the key questions regarding evidence are: (1) What is the nature of the evidence and how well supported is the argument for an effect of ill health? and (2) How should a regulatory agency respond?

In its final EIS on the Garrison to Spokane 500-kV line, BPA lists some of the evidence that has been confirmed in repeatable studies. Included are, for laboratory animals, "confirmed effects (on) perception, increased nerve excitability, faster muscle recovery from fatigue, decrease in bio-rhythm hormones, earlier neuromuscular development, and slower bone fracture repair," among others (BPA 1983, Table 4-10). DNRC believed it was imperative to obtain the best-available analysis of the implications of these findings, given the directives in MFSA and the high public interest in the subject. DNRC contracted with an expert in health physics and physiology to examine the possibility that BPA's proposed facilities would cause health effects.

In 1977, extensive hearings on a New York 765-kV transmission line showed there was no consensus among scientists as to whether electrical fields caused biological effects (Scott-Walton 1979), but research since then has led scientists to concede that biological effects do occur (Lee et al. 1982, Sheppard 1983a, BPA 1983).

COMMENT: The 20 years of research indicating that there is no evidence that the electrical effects of 500-kV lines pose a threat to human health "is not just a BPA conclusion. This is also the conclusion reached by numerous other reviews done by State and Federal agencies and other groups and individuals in the U.S. and other countries. This includes a review recently released by the World Health Organization which concluded that transmission lines of 400-800 kV do not constitute a danger to human health." (BPA testimony)

RESPONSE: The 1982 World Health Organization review referred to above (Hauf 1982) contained 68 literature citations, of which only 2 were published after 1977. Even though this review was recently published, it excludes the most relevant research and therefore cannot be considered adequate. (See also preceding comment and response.)

COMMENT: "The DNRC draft report also stated that confirmed effects in laboratory animals have been minor." (BPA testimony)

RESPONSE: The sentence referred to used the phrase "minor biological effects of unknown consequence..." (emphasis added) The use of the word "minor" was inappropriate, as it referred to the subtlety of the symptoms rather than the ultimate health consequences to the animal.

COMMENT: "The report prepared by Dr. Sheppard for DNRC indicated that pathological effects in humans exposed to electric fields at any field strength are unproven and speculative." (BPA testimony)

RESPONSE: Sheppard (1983a) also found that: (1) "The field effects that have been demonstrated in several animal studies suggest it is reasonable to expect that humans exposed to appropriately scaled electric fields may show physiological or behavioral alterations related to those observed in animals" (p. VII-6), and (2) "The epidemiologic data of persons exposed occupationally or in the home point to a small, but not ignorable, increase in the rate of certain cancers among persons exposed to low-level 60Hz magnetic fields, and possibly an increased rate of birth defects and stillbirths for the offspring fathered by males exposed to strong fields of a substation" (p. III-12). These statements reflect the early stages of research, and indicate the difficulty of interpreting statistical studies of human health.

COMMENT: "In addition, effects confirmed in some studies of laboratory animals are subtle and do not affect health, reproduction, or growth." (BPA testimony)

RESPONSE: Subtle effects may or may not ultimately affect the health of animals; a determination one way or the other cannot scientifically be supported until the mechanism causing the effect is known.

COMMENT: "The DNRC report appears to be attempting to set a field strength standard based on a very conservative recommendation from one individual, rather than assessing the impacts of the Garrison-Spokane line." (BPA testimony)

RESPONSE: After mailing a request for proposals to 160 contractors, DNRC contracted with Dr. Asher Sheppard, a highly-regarded scientist who is actively conducting neurobiological research on electromagnetic fields. BPA critiqued the scope of work for the contract, and agreed that all three finalists on DNRC's list were well-qualified. DNRC specifically designed the scope of work and selected a contractor qualified in the field of human physiology to address an essential inadequacy in BPA's assessment of the impacts of the Garrison-Spokane line: failure to address the implications to human health as shown in recent research demonstrating that electrical fields cause measurable responses in living animals or tissues. The Sheppard Report discussed a range of possible electrical field limits from 3 kV/m to 3 kV/m, with a 1 kV/m recommendation. It is incorrect to characterize the recommended limit as "very conservative" in the context of BPA's comment, 3 kV/m would more appropriately carry this label.

COMMENT: The recommendation of 1 kV/m is unsupported by any new information contained in the Sheppard Report, which contains no new areas of research that were not previously addressed in the recent BPA report on the biological effects of HVTL's (Lee et al. 1982). (BPA Testimony and BPA final EIS)

RESPONSE: The findings and recommendations of the Sheppard Report are substantially different than BPA's. DNRC concurs with Sheppard's conclusions, and believes they are well-supported.

The Sheppard Report, unlike the BPA Report, balances emphasis between two types of data: (1) research where a possible explanation of the observed effect is that the test animal is responding to such secondary aspects of the field as hair stimulation rather than the field itself, and (2) data from studies conducted "in vitro" or in other ways where sensory perception is not a factor. Sheppard does not draw overly strong conclusions from the "in vitro" research, but shows throughout the report that such studies present clear, important evidence for electric field effects that are not explained by secondary stimulation by the electric field. On pp. III-25 and III-42, for example, quantitative statements show that some "in vitro" studies involve in-tissue electric field strengths similar to those produced in humans exposed to strong electric fields near a transmission line. Sheppard also pointed to the need for a cautious interpretation of both the in vivo and in vitro research in the situation where one finds nonclassical phenomena such as responses "windowed" in frequency and field strength. The "window" results indicate that certain biological effects may occur at a given frequency or field strength, but not at strengths or frequencies above or below the frequency where the response occurs (Sheppard 1983b). Other differences between BPA and DNRC include, (a) recognition in the Sheppard Report that small effects on sensitive tissues and functions of the body -- hormones, nerve tissue, and circadian rhythms -- may not be small when expressed in the total organism, and (b) an extensive discussion of the inadequacy of data pertaining to effects on people.

COMMENT: The 1 kV/m level is unnecessary on the basis of pre-existing HVTL field strengths. Successful operation of thousands of miles of transmission lines with electric fields in excess of 1 kV/m at the edge of the right of way demonstrates the safety of fields above 1 kV/m. (BPA testimony, BPA final EIS)

RESPONSE: As pointed out in Sheppard 1983a (p. III-6), there has been no scientifically adequate study of the long-term effects of electrical fields on public health. Thus, the "successful" operation referred to does not provide adequate evidence for the absence of effects on human health.

COMMENT: "The DNRC report identifies only two other prior situations to support their 1 kV/m recommendation." (BPA testimony)

RESPONSE: This statement is incorrect. The draft report identifies four prior situations in New York, New Jersey, California, and the USSR. Each has limited electric field exposures to the general public on the basis of biological effects by setting a specific limit or by specifying a right-of-way width. Even though the specified limit is sometimes different than 1 kV/m, these prior regulatory actions support DNRC's recommendation because, once it is recognized that chronic exposure should be limited, it only remains to determine the limit. Such recognition would be a departure for BPA, which does not limit electrical fields except to reduce the potential for shocks (Lee et al. 1982, p. 42,43).

COMMENT: The recommended 1 kV/m level at the edge of the right of way is unusually low and presents a "unique field strength limit for a particular 500-kV line in the state of Montana." (BPA testimony, BPA final EIS)

RESPONSE: New standards are developed as new research is done and new analyses are completed. The fact that the 1 kV/m limit has not been adopted or previously used in Montana is not sufficient reason not to require it, especially when public health is involved.

COMMENT: "The final decision (of the California Energy Resources Conservation and Development Commission for the Geysers Unit 16 case cited above) indicated the 1 kV/m recommendation was not warranted." (BPA testimony)

RESPONSE: This statement is incorrect. The staff recommendation of 1 kV/m was a mitigating measure applicable to the entire transmission line under study. Configurations, voltages, electrical fields, and right-of-way widths varied among segments. The Commission overruled the staff recommendation only in a portion of the transmission line that passed through a state park, which was "used for intermittent, transitory recreational activity, (where) only temporary exposure to electromagnetic fields should occur." The Commission ordered the utility to acquire right-of-ways wide enough in residential areas and a planned development area to result in a 1.1 kV/m limit at the right-of-way edge in those areas "so the PG& E will not expose humans to a strength of electromagnetic fields in excess of those currently in operation" (State of California Energy Resources Conservation and Development Commission 1982). This action has been confirmed by a staff member (Phillips 1983).

COMMENT: "The DNRC report does not acknowledge that the California recommendation referred to a 230-kV line." (BPA testimony)

RESPONSE: A physiological response to a 1 kV/m electric field from a 230-kV ac line would be the same as from a field of the same strength caused by a 500-kV ac line.

COMMENT: The 1 kV/m field strength limit in the USSR cited by DNRC is out-dated and superseded by a higher field strength limit of 3-5 kV/m in the USSR. (BPA testimony, BPA final EIS)

RESPONSE: (From Dr. Asher Sheppard, DNRC consultant)

"It is frankly very unclear what the current USSR practices or operation standards are. The comments cited by the [BPA] EIS (Bourgsdorf 1980) (which I have not seen) do not seem to indicate the existence of a new USSR policy to supplant the one of which I am aware through the reference cited in my report (Lyskov et al. 1975). It is my understanding that at the meeting cited by BPA, Mr. Bourgsdorf, a transmission line engineer in the USSR, expressed his views about a relative overstatement of dangers of HVTL electric fields. In contrast, recent reports from scientists engaged in 50 Hz electric field research in the USSR, as cited in my report (Prokhorov et al. 1981), suggest the problem is still taken seriously, that field strengths of just a few kV/m are still considered to be agents for biological change, and that the issues require more research" (Sheppard 1983b).

COMMENT: The DNRC draft report does not justify the recommended limitation of electrical fields and does not acknowledge the qualifying factors contained in the Sheppard Report. The rationale for the 1 kV/m recommendation in the Sheppard Report is unclear. (BPA testimony, BPA final EIS)

RESPONSE: The DNRC draft was a report to the Board of Natural Resources and Conservation and to the public. No attempt was made to repeat or reword the Sheppard Report because copies of it were provided to the Board along with the draft report. Although the Sheppard report is technical in places, DNRC feels it addresses human health issues in understandable terms. Copies of the report are available to the public.

DNRC also asked Dr. Sheppard to respond to this comment: "In my report, I presented several arguments (Chapter VII, especially p. VII-10 and ff.) in order to make clear the sources of my recommendation... Such influential factors include dozens of research results, the degree to which each illuminates an area in which a potential health problem might exist, important dosimetric relations, the impact of the data on understanding of fundamental biological processes, and the relation to human physiology.

"To repeat myself (though not as fully as in my report): On the basis that there is reason to be cautious with respect to long-term exposure to 60 Hz fields, and in recognition that some electric field strength criterion-levels would be excessively large while others would be unachievably small, in consideration of possible chronic effects among a population of sensitive persons, in consideration of the desirability that no person be chronically subjected to a perceptible electric field, and in consideration of the occurrence in the laboratory of biological effects below 1 kV/m, and in recognition of the practical fact that natural background levels at 60 Hz could not be realistically achieved and would be very costly, I concluded that, with current information, 1 kV/m was a realistic, achievable level that optimized human health factors.

"I would like to make it very clear that I do not consider 0.33, 0.5, 1.0, 2.0, or 3.0 kV/m at the EoROW [edge-of-right-of-way] to be indistinguishable or interchangeable levels of electric field safety. Barring surprises due to intensity windowing, these levels represent a nine-fold range and the lowest level gives a greater margin of safety than any other, or conversely, the highest level provides the least margin of safety. Very simply, I recommend a single level, 1 kV/m, and feel it provides a highly safe and practical criterion; any higher level gives me less confidence that chronic effects would be avoided. The 0.33 to 3.0 kV/m range is provided to indicate the limits I place on an acceptable criterion. A value above 3 kV/m is unacceptable to me; a value of 3 kV/m is not recommended, but if a regulatory agency finds compelling reasons to permit that level, I believe -- albeit with lower confidence -- that there would still be no chronic health effects on any exposed human beings. Of course, I want to recommend a value in which I have the fullest confidence, and one which should not require downward revision in the foreseeable future, but neither should it be unnecessarily stringent. After much thought, 1 kV/m represents such a criterion level for the EoROW electric field. I trust that my judgment will be validated or corrected by the evolution of laboratory data and through further debate on public issues such as those concerning the Garrison-Spokane HVTL in Montana.

"It is argued (by BPA) that Sheppard bears the burden of proving a distinction between public health effects of 1.0 vs 3.0 kV/m. As stated above, there is an undeniable three-fold difference between criteria at 1.0 or 3.0 kV/m. If this arithmetic fact is to be made moot, there must be a presumption that electric fields of such magnitudes represent no challenge to human health, so that any level is as good as another, and since the highest level minimizes costs, it would be preferred. My entire effort is directed at demonstrating the need to accept the idea that it is necessary and reasonable to be cautious with regard to chronic exposure to 60 Hz electric fields. In light of research findings of biological effects with effective fields near or below 10 kV/m, and some below 1.0 kV/m, it seems incautious to presume that there is a sharp threshold for

chronic effects that lies well above 3.0 kV/m. Because presumption of such a threshold is unacceptable, I feel no obligation to 'prove' a distinction between these two levels. Or, in other words, my 'proof' is the arithmetic factor of three, which, barring more complete knowledge, suggests a three-fold ratio in the likelihood of chronic effects. Indeed, I feel it would be a burden of others to establish the existence of a threshold for chronic effects well above 3 kV/m in order to justify chronic exposure at 3 kV/m, but clearly, the research does not support definition of any such thresholds at this time.

"In summary, the BPA attempts to argue that by citing a range of values from 0.3 to 3.0 kV/m for EoROW criterion levels that I would consider reasonable I have rendered these levels indistinguishable, that the 1 kV/m is unusually low and unnecessary because of prior experience. In response I have shown that by citing a range of levels, I do not make them indistinguishable, that the 1 kV/m level has adequate basis in the literature as well as in the judgments of others who have considered establishment of an EoROW level, and that despite prior experience such electric field criteria are required" (Sheppard 1983b).

Additional rationale for this recommendation is found in the section of this chapter entitled "Limitation of electrical field at the edge of the right-of-way."

COMMENT: "Even the Department's consultant, Mr. Sheppard, in his book called Biological effect of electric and magnetic fields of extremely low frequency has written, 'There is no evidence that the public health or ecological systems have been jeopardized in the slightest by artificial electromagnetic fields." (Montana Power Company)

RESPONSE: The book was published in 1977 and reflected the status of research at that time. As Dr. Sheppard pointed out in the report to DNRC, much of the earlier research was not able to detect the subtle biological effects that have been confirmed in laboratory studies in the last several years.

COMMENT: "In practical terms, there are no residences within about 1,000 feet of the proposed line route (Taft) in Montana." (BPA Final EIS)

RESPONSE: This statement is incorrect. There are four residences within 1,000 feet of DNRC's AA route segment in the Maxville area, and a new house north of Deborgia within 1,000 feet of the right-of-way (Spear's residence).

COMMENT: "Recommendation #4 of the draft report, in effect, has adopted a standard for field strength of one kilovolt per meter at the edge of the right-of-way and fifty dBA as a noise limitation. In effect, then, the Department asks this Board to engage in what we think is de facto rulemaking, absent the rulemaking process. This Board has adopted the model rules of the Administrative Procedure Act. Rulemaking under the APA and the model rule involves three steps. Namely, notice of proposed agency action, an opportunity to be heard, and the final agency action. Our concern is that the adoption by this Board of the Department Recommendation 4 will spill over into other utility transmission lines as a precedent without giving the utilities the opportunity to participate in a rulemaking proceeding." (Montana Power Company)

COMMENT: "In summary, if DNRC believes there is a need to establish state standards for transmission line audible noise and electric fields, a more thorough analysis representing a wider range of input would be required." (BPA)

RESPONSE: In its determination of minimum adverse impact, MESA requires that the Board consider: (1) the effects of the proposed facility on the public health, welfare, and safety (75-20-301(3)(d), (2) land use impacts, including area of land required and ultimate use and consistency with existing and projected nearby land use (75-20-503(2)), (3) radiation impacts, including land use controls over development and population and analyses and studies of the adequacy of engineering safeguards and operating procedures (75-20-503(6)), and (4) noise impacts, including operational levels, and relationship of present and projected noise levels to existing and potential stricter noise standards (75-20-503(7)).

Clearly, the central feature of the concept of a right-of-way easement is a restriction on certain land uses because of incompatibility with certain features of a facility, in this case, emission of non-ionizing electromagnetic radiation. According to numerous sources, the electrical field and noise level at the edge of the right-of-way is, under present engineering practices, a consideration in the selection of an appropriate right-of-way width, and widths vary among utilities, and, for example, biological effects of electrical fields are the subject of substantial current research efforts (Sheppard 1983a, Rish and Morgan 1979, Power Technologies, Inc. 1981, EPRI 1982).

The evidence in the record before the Board reflects a difference of opinion concerning an appropriate right-of-way width. In making determinations relative to noise limitations and to field strength at the edge of a right-of-way the Board is not engaged in the rulemaking process. On the contrary, the Board is making determinations relative to established standards that were set by the legislature in the Major Facility Siting Act, i.e., that the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, in addition to the standards referenced in paragraph one of this response. The Board has a clear legal duty to find and determine whether the standards established in the Siting Act will be met by the construction, operation and maintenance of the facility. Such a determination is limited by the record before the Board based upon the specific project under consideration. Consequently, the process that the Board is engaged in is controlled by the provisions of the Siting Act rather than those of the Montana Administrative Procedures Act (MAPA). Furthermore, to the extent any argument may be made that the board is engaged in rulemaking when making decisions pursuant to section 75-20-301, MCA, such argument is negated by section 75-20-103, MCA, which clearly provides that the Siting Act supersedes such laws as embodied in MAPA.

COMMENT: "There are no national standards for electric field strength from transmission lines. The U.S. Environmental Protection Agency investigated this subject and found no evidence that existing field strengths posed a health hazard." (BPA final EIS)

RESPONSE: Federal activity on this subject has not terminated. The USDOE recently awarded a contract to a researcher at Carnegie-Mellon University to investigate whether recent research indicates that a risk assessment of HVTL electric fields is necessary. EPA's research program on non-ionizing radiation (including HVTL electric fields) is presently the subject of hearings before the U.S. Congress House Committee on Science and Technology (Clark 1983). The Denver EPA Office has conducted a preliminary review of the Sheppard Report, and supported the concept of limiting chronic exposure by adjusting the right-of-way width, as follows. "Dr. Sheppard has prepared an objective, professional review of the direct biological effects of high voltage transmission lines. A home near the edge of the ROW would more closely approximate a chronic exposure situation -- especially for pre-schoolers and stay-at-home parents.... Proper design of the HVTL to

limit the exposure at the edge of the ROW is a better approach to public health protection than one dependent upon determining the location and effective shielding of structures. From a practical standpoint, the latter option would foster a great administrative workload associated not only with characterizing existing homes, but also with keeping track of any new construction along the line" (Giedt 1983).

COMMENT: The projected 1.8 kV/m electrical field at the edge of BPA's proposed line is a maximum, and factors such as decreased electrical load decrease the field. Shielding such as from vegetation will also reduce the field. (Washington Water Power)

RESPONSE: These observations are correct. DNRC's information has been provided by BPA and is the best available at this time. There may be no practical method of accomplishing the recommended 1 kV/m limit, other than widening the right-of-way in a small portion of the route where houses exist or are likely to exist in the future. According to a study of the cost of establishing a 1 kV/m limit, widening the right-of-way is the most economical approach (Rish and Morgan 1979). The study was done by the Carnegie-Mellon researcher referred to in the response to the preceding comment.

COMMENT: We are disappointed that the Sheppard Report devoted so little attention to induced shocks from electric fields. (U.S. Environmental Protection Agency)

RESPONSE: DNRC asked Dr. Sheppard to concentrate on biological effects other than those from induced currents in objects and shocks to people.

COMMENT: "Regarding honeybees, effects can be easily prevented so reimbursement for possible honey losses contained in DNRC recommendation No. 5 (p. 71) is not necessary. Based on previous recommendations by DNRC on the Townsend-Garrison line, BPA has prepared information for bee keepers that describes results of honeybee research and explains how effects can be prevented." (BPA testimony)

RESPONSE: DNRC's statement regarding reimbursement was an error, and the correct wording is found in construction standard 16.7 on page 96 of the draft report. DNRC is recommending that a set of joint operation and maintenance standards be developed for the 500 kV line, and this requirement would more appropriately be placed in this section rather than in construction standards.

COMMENT: "It should be pointed out that effects on bees are related to electrical currents induced inside wooden hives, not to the electric field outside the hives." (BPA testimony)

RESPONSE: BPA research has not yet clearly determined the effects on bees. Although the BPA research at the Lyons test site shows that shielding substantially reduces adverse effects on beehives in electrical fields, the cause of effects is not known for certain, and the shielding experiments were based on a small sample size (Rogers et al. 1980, 1981 and 1982). DNRC believes that until the effect is understood, the most prudent mitigation measure is to not locate hives in the right-of-way.

COMMENT: "A report prepared for DNRC by Mr. Dietrich (ERM, Inc. 1982) confirmed the accuracy of BPA's method for predicting electric field strength levels. The maximum field strength for the proposed 500-kV double circuit line will be 7.8 kV/m. In practical situations, with planned line loading, the maximum field will be less." (BPA testimony)

RESPONSE: DNRC has not questioned the accuracy of BPA's method of predicting field strengths, but rather contracted with ERM, Inc. to determine how field strengths vary with irregular terrain, the effects of shielding, and to review possible mitigating methods.

COMMENT: During the 16 years that BPA has operated 500-kV lines, designs were improved to reduce the production of audible noise. The Dietrich report prepared for DNRC confirmed that the proposed BPA line is typical of today's lower noise level designs. The proposed line will produce less noise than most of the 500-kV line that has operated for 10 years in Montana. The Dietrich report also verified that BPA accurately predicted the average noise level that would be produced by the proposed line. Montana has no noise standards related to transmission lines and there are no such national noise regulations (BPA testimony, BPA, BPA final EIS, Washington Water Power).

RESPONSE: DNRC and BPA agree as to the average noise levels of the transmission line. The issue being addressed by DNRC is potential noise impact to people who may live next to the right-of-way. MFSA requires DNRC to address future circumstances, so BPA's proposal to build a large transmission line triggers this noise assessment, and the need to determine acceptable noise levels. Montana cities do have noise control ordinances, and noise standards become established in rural areas when there are noise sources, such as noise limits on outboard motors on some lakes. Past practice with respect to estimation of noise impacts is not an acceptable guide to be used when noise sources become more numerous, just as past engineering practice is not a measure of current good transmission line design.

COMMENT: The estimate of noise impacts is too high because DNRC's contractor used too high a figure for the percentage of occurrence of foul weather. The high estimate was used because Dietrich was not aware of available weather data which show that the precipitation percentage on an hourly basis is about half the high level assumed by the Dietrich and DNRC reports. (BPA testimony, BPA final EIS)

RESPONSE: DNRC agrees that the estimate of foul weather occurrence used in the analysis should be lowered from 10 percent to 5 percent. The recommendation for a 265-foot-wide right-of-way to limit noise in residential areas is thus also reduced (see Recommendations chapter) because noise from powerlines largely corresponds to the amount of time it rains or snows. DNRC requested BPA to provide the weather data referred to in BPA's testimony in September 1982, but it was not provided until after DNRC published its draft report. BPA's noise analysis in the draft EIS on the Garrison-Spokane 500 kV line was based on an assumption that rain occurred less than one percent of the time (Burns 1982). BPA has revised its noise estimates upward since then.

COMMENT: DNRC's recommendation of a wider right-of-way because of noise during foul weather is based on an unjustified modification of an EPA-recommended noise level guideline to protect health and welfare with an adequate margin of safety. (BPA testimony, BPA final EIS)

RESPONSE: The EPA guideline is 55 dBA (Ldn). According to DNRC's contractor on noise impacts, several reliable experiments conducted since the EPA guideline was established have shown that transmission line noise is consistently more annoying than other noises -- including those noises that were the basis of the EPA guidelines -- because of high frequency components (ERM, Inc. 1982, Dietrich 1983a). This data leads to the conclusion that the EPA guideline should be adjusted by at least 5 dBA downward when applying it to transmission line noise.

COMMENT: BPA has received no complaints about audible noise from the 3-bundle 500-kV lines west of the Cascades which are similar to the proposed line designs for Garrison-Spokane. These lines have been designed to reduce noise. (BPA final EIS)

RESPONSE: DNRC's information indicates the same transmission lines would cause noise levels 3 dBA higher because of increased elevation if they were located in Montana, and thus BPA's complaint data may not be applicable to western Montana (Dietrich 1983a).

COMMENT: "DNRC should clearly indicate if it is their conclusion that the EPA level should be changed. Dietrich stresses that annoyance conditions related to transmission line noise occur only a small percentage of the time and require the simultaneous occurrence of several events, namely foul weather, open windows, and quiet ambient noise within a home that is located near the right-of-way." (BPA testimony)

RESPONSE: DNRC agrees with ERM, Inc.'s conclusion that it is reasonable to apply the adjustment to the EPA guideline. The determination that transmission line noise would be of concern to the public was based on a number of considerations including : (1) there are few data to predict noise impacts in quiet, rural environments (ERM, Inc. 1982), (2) Montanans living in rural areas highly value a quiet, natural environment, (3) weather in western Montana is highly variable, according to location, elevation, and seasonal or yearly variation, (4) transmission noise is most intrusive during bad weather, so an informed decision on purchasing or locating a residence or homesite would have to be made during such weather, (5) a noise impact criteria would be applied only in residential or subdividable areas.

As pointed out on page 47 of the draft report, there are a number of other measures that could be used to predict noise impact, but none of these estimates carries the weight of the EPA guideline, which was based on extensive survey data. DNRC therefore chose to rely on it, though it is possible that the impact zone may extend beyond what DNRC is recommending.

COMMENT: "BPA policy is to investigate complaints about line noise and to provide mitigation if a BPA facility is not in compliance with applicable noise regulations. The general language in DNRC construction specification No. 16.9 should be modified to reflect BPA mitigation policy." (BPA testimony)

RESPONSE: The language of the specification referred to is the same as that required for the Townsend-Garrison segment of this transmission line and agreed to by BPA. It is DNRC's understanding that this provision is now BPA policy.

COMMENT: The noise from the proposed line would not be discernible from the ambient noise during heavy rain. (Washington Water Power)

RESPONSE: Studies show that corona noise is of a different character than rainfall noise and can be heard above rain noises (ERM, Inc. 1982, Dietrich 1983a).

COMMENT: We question whether the increased cost of acquiring additional right-of-way and thus removing land from public use because of potential noise impacts is warranted. (Washington Water Power)

RESPONSE: DNRC's recommendation applies only to residential areas, i.e., places where people would live. If BPA does not bear the cost then the homeowner or landowner would bear the impacts.

COMMENT: Wire fences, sprinkler lines, and aluminum buildings and roofs deteriorate in the electrical field due to electrolysis. (public)

RESPONSE: There is no evidence of such deterioration in the descriptions of effects accessible to DNRC.

COMMENT: Currents are induced in wire fences and metal gates. (public)

RESPONSE: Currents can be induced in metal objects that are not well grounded and that are close to high-voltage lines, and persons can receive shocks from such currents. Most such effects on people are well known--except for exact "let-go" thresholds in children--and effective mitigation measures, usually grounding of metal objects, have been developed. No cases of children having accidents because of this phenomenon in utility ROW's are known. Grounding is the responsibility of BPA which has standard grounding practices that are accomplished before the line is energized.

COMMENT: Electrical fields can cause birth defects and fertility problems in breeding stock. (public)

RESPONSE: There is some research that shows slight statistical correlations with chromosomal breakage and birth defects in test animals and in children of electrical substation workers, both of which are exposed to much higher electrical fields for much longer periods than cattle that would not normally remain for long periods under transmission lines. These findings are puzzling to scientists because the research findings are not consistent, studies of people are difficult to conduct, and often there are other possible explanations for the slight statistical correlations. There are many other studies that do not support these findings and studies are continuing. Descriptions of the studies may be found in both DNRC's and BPA's reports (Lee et al. 1982, Sheppard 1983a).

CHAPTER THREE -- COMMENTS AND RESPONSES

DNRC received 209 letters and 627 signatures on petitions in response to its draft EIS. The list of people responding to the draft is presented at the end of this report. The list does not include the names of people signing petitions, but does contain all the legible signatures on letters, many of the letters were signed by more than one person. Three hundred and fifty five people signed petitions in favor of undergrounding and 250 signed petitions protesting any crossing of Rock Creek. All the respondents were opposed to some portion of the line, and many were opposed to the line altogether. The growing awareness of the line's potential impacts and of the apparent power surplus in the Northwest led many to ask why the line is needed.

As required by the Montana Environmental Policy Act, DNRC attempted to answer all comments that were "substantive," meaning pertinent to the situation and not merely an accusation, unsupported comment, or rhetorical question. Many letters made similar points, which were consolidated. Editing was performed for clarity and brevity. Comments on electrical and biological effects are responded to separately in chapter two.

SOCIAL AND LANDOWNER CONCERNS

COMMENT: The Taft South route is better than Taft North because less private land would be crossed. (public)

RESPONSE: One of the most persistent public comments was that the line should be placed on public land to the greatest extent possible. This is one of the major reasons DNRC and BPA chose Taft South, which would cross approximately 20 miles of private land between the Garrison substation and Miller Creek, compared to the 50 miles that would be crossed by Taft North. Impacts along these routes differ but the issue of private land does not by itself make Taft South better than Taft North (see Siting Preference in Update Chapter).

COMMENT: One of the reasons the Taft North Route is unsatisfactory is that it passes too close to the town of Drummond. (public)

RESPONSE: Although the 4-mile-wide corridor would pass near Drummond, the reference centerline for this route would be more than 2 miles from the edge of town. North of Drummond in Edwards Gulch, there are four homes that would be nearer the centerline. If the Taft North Route were selected, an attempt would be made to place the line to minimize visibility from the town and to the extent possible, from the houses in Edwards Gulch. Topography would prevent the line from being seen from most points in Drummond, and would help keep the structures out of sight of the homes in Edwards Gulch. The actual impacts to scenic values and other concerns would depend on the final "fine tuning" of the line placement. The current alignment (reference centerline) would be visible from homes a few miles east, west and south of Drummond, and could be seen by travelers on Interstate 90.

COMMENT: The federal ownership of the project would result in a loss of taxable valuation in Granite County no matter which route were used, but the loss would be much greater if the Taft North Route were used. (public)

RESPONSE: This is correct. BPA's draft EIS contained an estimate that if the transmission line along the Taft North Route were privately owned, it would generate between \$14 million and \$28 million in tax revenue over the life of the project for Granite County. The Taft South Route was expected to generate only \$7 million to \$14 million. Either Taft route would have very minor impacts to the existing Granite County tax base.

BPA would acquire an easement to build across private land, rather than a fee simple title to the land. Private land would remain in private ownership. Further, the transmission line would be expected to have little effect on existing land uses, and would largely avoid homes and commercial buildings, and would span irrigated cropland. Long-term loss of rangeland productivity would be very slight.

COMMENT: More private land would be condemned along the Taft North Route than along Taft South. (public)

RESPONSE: Taft North crosses more private land than Taft South, but the amount of land condemned would depend on the willingness of individual landowners to accept compensation payments offered by BPA.

COMMENT: There is no need for any power line to pass through an inhabited area. There is enough uninhabited land in Montana to hold many powerlines, if necessary. It would be ridiculous to jeopardize the health and lives of the 90 families in the Miller Creek area by placing the line there. (public)

RESPONSE: The reference centerline of the Taft South Route would be within 2 miles of more than 300 homes in the Miller Creek -- Blue Mountain -- south Missoula area. Nearly all the homes in the Miller Creek drainage would be out of sight of the line because of intervening trees and mountains. The line would pass down Cahoot Canyon, south of most of the homes. For most Miller Creek residents, the greatest exposure to the line would occur during travel on the Miller Creek road. Four homes near the confluence of Miller Creek and the Bitterroot River and the Blue Mountain area would be within 1/4 mile of the line. Three additional residences farther up Miller Creek also would be within 1/4 mile of the line. Residents of these seven homes would sustain high visual impacts.

DNRC's independent analysis of biological effects of high voltage transmission lines indicates people in the Miller Creek area live far enough from the proposed line to avoid any possible effects.

COMMENT: Visual and other environmental effects of the line would reach outside the right-of-way and degrade property values, although BPA would not compensate for property values outside the right-of-way. (public)

COMMENT: The transmission line could reduce property values 30 percent. (public)

COMMENT: This monstrosity will devalue our property and we have been told we will not be reimbursed by BPA because the tower will not touch our property. When it comes time to sell, this will be a very real loss. (public)

RESPONSE: DNRC acknowledges that the presence of the transmission line could adversely affect market values of nearby land. However, research on land value effects of major transmission lines have not been conducted in Montana.

It is BPA's policy not to compensate for adverse effects on lands located outside of the transmission line right-of-way. There have been instances where landowners have successfully sued utilities for compensation for devaluation of land near transmission line right-of-ways. An example of a case involving BPA is U.S. v. Abbott, Civil #79-403, Oregon, 1981.

COMMENT: Prospective land buyers have told me that they do not want to purchase land if a 500-kV transmission line might be close to them. (realtor)

RESPONSE: DNRC acknowledges the presence of the transmission line could potentially affect the development potential of nearby land. However, valid studies of effects of large transmission lines on the desirability of land for development, have not been conducted in Montana.

COMMENT: We pay taxes on property which is confiscated by BPA. (public)

RESPONSE: BPA acquires only an easement to use the land for a specific purpose. Ownership and tax obligation do not pass to BPA. However, the landowners interest in the property has been decreased and he may be eligible to have taxable value of the property decreased.

COMMENT: Will BPA pay for cattle and roads lost and the extra work caused by the line. (public)

RESPONSE: BPA will compensate farms and ranches crossed by transmission line right-of-ways and access roads for property loss and damages resulting from project construction and operation. Compensation for road impacts and additional work resulting from project construction and operation need to be negotiated with BPA as part of easement agreements.

COMMENT: The Taft North Route would cut through a lot of irrigated land and would leave some farmland parcels isolated and useless. (public)

RESPONSE: In locating the transmission line, effort would be made to avoid irrigated cropland, to span over irrigated fields, or to locate towers in fields as to minimize interference with existing and planned irrigation operations. If these efforts were unsuccessful, BPA would be obligated to compensate landowners for replacement of existing irrigation systems with more suitable system, or for lost land productivity.

COMMENT: BPA should contact affected landowners. (public)

RESPONSE: BPA has several interactions with landowners throughout the planning and construction phases of a project. The first of these are indirect, through public meetings and workshops to identify issues and public concerns, and through hearings on the environmental impact statements.

After route choices have been narrowed, individual landowners are asked for permission to survey right-of-way and access road locations. BPA representatives usually approach the landowner in person at this stage, but absentee landowners may be telephoned or reached by mail. In granting permission to survey, the landowner may specify that surveyors must coordinate with the landowner.

The landowner is contacted when an appraiser inspects the property and can accompany the appraiser. The landowner deals directly with BPA in settling the easement agreement. As part of the easement agreement, the landowner may require contractors and BPA construction inspectors to meet with him to discuss any problems. After completion of construction, BPA asks landowners about any need to repair or pay for any damages that occurred during construction. Landowners with concerns during project construction or operation can call BPA's land liaison in Missoula (telephone 329-3737).

COMMENT: BPA promised us wonderful things when we granted an easement for a 230-kV line, but workers broke the promises; how can I make sure BPA lives up to its word this time? (public)

COMMENT: The responsibility rests on BPA to assure all property owners that their health, livelihood, and future property values will not be jeopardized, but they will not do this, which shows the public is not adequately protected. (public)

RESPONSE: DNRC recommends BPA hire a person responsible for responding to landowner concerns occurring during construction of the transmission line. In addition, DNRC proposes to monitor project construction.

Landowners have the right to negotiate special terms and stipulations in easement agreements, all of which should be in writing. If written agreements are broken, the landowner is entitled to legal recourse.

COMMENT: We don't want the powerline and will not grant BPA any easements or sign any papers of any sort. (public)

RESPONSE: BPA will first attempt to negotiate a voluntary purchase of an easement across private property. If it cannot reach a suitable agreement with the landowner, it may acquire an easement through use of eminent domain.

COMMENT: In accepting BPA's recommendation of the Taft South Route, DNRC ignores the impacts on tourism and the countless big game hunters and recreationists in western Montana. Tourism is becoming increasingly important to the economy of this area, and the powerline would have serious effects on this source of income...we favor the Hot Springs Route. (Mineral County Commission, public)

RESPONSE: DNRC acknowledges that the impacts mentioned in the comment might occur and that the economy of western Montana and Mineral County could be affected. Public opinion strongly favors routing the line on public property to avoid direct impacts on people, and DNRC's draft EIS (p. 112) shows the Hot Springs Route would cross by far the most private land, and pass near the most houses of any of the routes. Further, it would cross more intensive-use recreation sites than any other route.

RECREATION CONCERNS

COMMENT: The number of people living within 2 miles of a powerline does not necessarily have any bearing on how many people would be affected. Many people living farther from the line could see it while driving or taking part in recreation. Many of us use the Miller Creek area and the Bitterroot River for recreation, and it seems unreasonable that we should have to drive 50 or 60 miles to find a site with no powerline when we have such a fine area close to home. I would like to know how you decide which recreation area you are going to sacrifice. (public)

RESPONSE: DNRC felt that people who had the line in view of their homes would be more affected than those who saw the line only while driving or at a recreation area. It is not possible to construct a powerline from Garrison to Taft without crossing or coming near an area used for recreation, but DNRC attempted to keep recreation impacts as low as possible. In the case of the Bitterroot River for example, the impacts of a single crossing, though substantial, would still be limited to a short stretch of river, unlike those that would result if the line were to parallel the river for some distance. Recreation areas were studied in terms of how sensitive they would be to the intrusion of the line. Regarding recreation impacts, DNRC felt that wilderness areas were the worst place for a powerline, with river crossings also to be avoided as much as possible. DNRC has evaluated the possibility of placing the lines underground at the Bitterroot crossing to reduce visual impacts (see The Undergrounding Option in Project Update chapter).

COMMENT: DNRC's draft EIS says, "Supplemental data including information on recreation areas...were necessary for DNRC to evaluate BPA route segments" (page 11). However, every item listed as supplemental was used by BPA in the recreation impact analysis. In addition, BPA gave consideration to impacts on travelers on standard highways, in view of the highly scenic quality of the study area. (BPA)

RESPONSE: DNRC collected additional information on several areas of concern, such as the Bison Range and Blackfoot River corridor. DNRC used more detailed scale mapping than BPA to define the impact risks more thoroughly, and measured the amount of public land available for dispersed recreation along the routes, which BPA did not do.

In the recreation assessment, DNRC weighted the recreation resources, in part, through a measure of viewer exposure -- how many people see the line. This measure (developed by BPA) is based largely on the line's proximity to primary or secondary roads. Thus, impacts to travelers on standard (and other) highways were considered by DNRC.

COMMENT: We feel that the transmission line will increase our present problems with radio reception caused by a nearby BPA transmission line tower and may also hurt T.V. reception. (public)

RESPONSE: These problems can be corrected by BPA and DNRC recommends that the Board require such corrections in the Construction Standards (#16.8). Also, FCC rules and regulations require BPA to correct these problems. The FCC considers transmission lines to be incidental radiation devices: "An incidental radiation device shall be operated so that the radio frequency energy does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference" (Loftness 1977).

WILDLIFE CONCERNS

COMMENT: We disagree with the statement on page 4 of the draft EIS that BPA's centerline represents general conditions in the 4-mile wide corridor. This centerline was carefully located to avoid as many impacts as possible in "sensitive environmental areas." (BPA)

RESPONSE: DNRC appreciates the work BPA staff did to identify a low-impact centerline. However, DNRC believes it is prudent to leave open the option for further centerline adjustments within the 4-mile-wide corridor to reduce impacts.

COMMENT: A route through the Miller Creek area would affect the eagles who live in the Miller Creek corridor. (public)

RESPONSE: Construction of the lines may affect eagles if nest sites are disturbed in spring or summer. DNRC knows of no nests in the vicinity of the Miller Creek crossing, but a special effort will be made to search there during centerline study. If nests are found, appropriate mitigating measures -- such as timing restrictions on construction -- can be implemented. The lines are not believed to pose a significant collision hazard to the eagles.

COMMENT: Wildlife security areas, winter ranges, and other components of habitat are finite resources, which are not renewable once development occurs on or near them. The proposed BPA powerline would adversely affect wildlife by providing access to thousands of acres of undeveloped areas. A very conservative estimate is that elk hunting contributed about \$30 million to the Montana economy last year, and the building of the proposed powerline would have a long-term economic effect to our state by reducing elk hunting opportunities. DNRC should more thoroughly evaluate the long-term economic and aesthetic impacts to our state which would result from this powerline. (Montana Wildlife Federation)

RESPONSE: DNRC agrees, and is recommending that BPA fund a monitoring study to document the extent of powerline-related wildlife losses, including related economic losses. Such a study could provide the basis for efforts to reduce these losses.

COMMENT: More specific mitigation and compensation criteria should be developed for the inevitable losses that would occur to wildlife and wildlife habitat if the powerline is built along the Taft route. The final mitigation plan should specify acre-for-acre replacement of wildlife habitat that is degraded by the line. Public land managers, in cooperation with state and federal wildlife personnel, should identify and designate these areas, purchasing private land from willing sellers if necessary before construction of the powerline. BPA is increasing project costs by \$12 to \$22 million to place the line away from people by selecting the Taft Route; if BPA is willing to incur this added expense to mitigate residential impacts, it should also be required to spend what is necessary to properly compensate for losses to wildlife. (Montana Wildlife Federation)

RESPONSE: DNRC agrees that BPA should take whatever measures are necessary to mitigate or compensate for losses to wildlife. Throughout the joint State and Federal siting processes it was recognized that natural resources probably would incur high impacts from selection of the Taft Route to reduce direct impacts to humans. In view of the recognized impact risk to natural resources, state and federal agencies agreed to implement mitigation measures.

COMMENT: The line should be placed in as many clearcuts and other roaded areas as possible, and fragile areas such as the Rock Creek drainage and designated roadless areas should be avoided. (Montana Wildlife Federation)

RESPONSE: DNRC and DFWP currently are conducting a centerline study to identify areas where centerline adjustments might reduce wildlife impacts or avoid sensitive areas such as Rock Creek. Avoidance of all RARE II areas is not possible on the Taft South route.

COMMENT: Access roads necessary for construction and maintenance of the powerline will affect wildlife by opening habitat to vehicles such as motorcycles, snowmobiles and jeeps. A route crossing Rock Creek south of Kitchen Gulch would affect winter range for elk and mule deer and also a recently-introduced bighorn sheep population in the Babcock Mountain-Spring Creek area. (public)

RESPONSE: DNRC agrees. See discussion of access road impacts in the "Update" section of this report and discussion of Rock Creek.

COMMENT: The statement that "access road requirements...were not used [by BPA] in evaluating impacts" (page 8) is not correct. Access roads were considered a major cause of impact in almost every resource analysis for the BPA EIS, including wildlife, geology/soils, vegetation, cultural, recreation, socio-economic, and aesthetics. BPA and DNRC both used the same access road estimates. (BPA)

RESPONSE: BPA's discussion of access roads in its draft EIS was inconsistent and inadequate. BPA did not adequately discuss the impact of access roads on fisheries or on big game security. DNRC noted inconsistencies in BPA's access road mileage estimates. As a result, BPA generated a new set of mileage estimates that DNRC used in its impact analysis, and that were used by the interagency team at its November 1982 meeting. BPA mileage estimates in the final EIS are essentially the same as those in the draft EIS (BPA 1982, 1983).

UTILITY UNDERGROUNDING

COMMENT: Undergrounding costs only 10 cents/mile/year/rate payer - using BPA's \$7 million/mile estimated for undergrounding, amortized at BPA's rate of 4 percent over the 35 year lifetime of the project and spread over BPA's rate base. (public)

RESPONSE: See "Undergrounding Options" in Project Update chapter.

COMMENT: Undergrounding has been done for years in other countries like Sweden, most other European countries and Japan. (public)

RESPONSE: As far as DNRC can ascertain, there are only 12 miles of 500-kV underground line in the world. Lines of smaller voltage are undergrounded more commonly. For 500-kV lines, the technology is only developing. Undergrounding is possible but costly.

COMMENT: I am asking that the route be moved from the [lower Miller Creek] valley floor (productive agricultural land) to the ridge top south of the valley which is used only for grazing livestock.

Let me inject here that I bought my home and moved to the Miller Creek Valley to get away from city type noises and pollution. I therefore do not cherish the thought of a constant monotone with an occasional snap and crack at a level that I cannot tune out.

My neighbors and I bought and/or built our homes in Miller Creek for the "pristine" beauty of the area as it now is. We did not and do not look forward to viewing a powerline and related huge - ugly - steel towers from our living room or dining room windows.

I am therefore asking that you strongly consider putting pressure on BPA to underground the line if it comes through the Miller Creek area. I believe this should be considered a trade-off for no payment for devaluation of our property.

BPA has repeatedly stated that they do not have the technology to underground. What better time than now, when the power from these lines is not needed, to work on the technology for such a project. (public)

RESPONSE: DNRC has evaluated the possibility of undergrounding in this and other problem areas (see Undergrounding Options). If BPA were willing to underground approximately 5.5 miles of line from the mouth of Cahoot Canyon south of Miller Creek to the terminal west of the Bitterroot River, it might be feasible to route the line along the ridge mentioned. Otherwise, location of the overhead line on the ridgeline would greatly increase the visual impacts for far more people than would see it in its proposed location along the base of the ridge.

AERONAUTICS CONCERNS

COMMENT: We support the original high crossing of Rock Creek, which we understand was abandoned because of complaints that the lines would be more than 200 feet above the valley floor and would endanger aviation. We find this rationale without merit because aviation regulations specify that a minimum flying height of 500 feet be maintained during inclement weather conditions. (public)

RESPONSE: (From Aeronautics Division, Montana Department of Commerce)

Federal Aviation Regulation Part 91.79 refers to the minimum safe altitudes over open water or sparsely populated areas to be any altitude allowing for an emergency landing if the power unit fails or 500 feet above any person, vessel, vehicle, or structure except when necessary for takeoff or landing.

The long established Rock Creek route is heavily used during adverse weather which includes low ceiling conditions. It is, therefore, conceivable that a pilot, in order to comply with FAR 91.79, could, because of the BPA structures, be pushed up an additional 500 feet and into the clouds (below mountain tops) with possible fatal results.

It must also be pointed out that aircraft using the Rock Creek route and landing or taking off from the Rock Creek Airport are either descending to land or climbing out and any high span of cables will create a hazard and adversely affect the use of Rock Creek Airport. It should also be mentioned that there are at least two permanently based aircraft as well as a commercial maintenance operation on the Rock Creek Airport.

GENERAL CONCERNS

COMMENT: In discussing the multimillion dollar cost of various routing options, it is good to recall that between \$1 million and \$2 million worth of electricity will flow through this line every day. (public)

RESPONSE: According to DNRC calculations, 70 percent (the share not owned by Montana Power) of 1,400 MW, available 75 percent of the time (average availability of Colstrip for planning purposes) amounts to 735 average MW, or 17.64 million kWh per day. If these kWh are valued at 49 mills each, an average daily value of power shipped is approximately \$864,000.

COMMENT: There is an alternate option for routing the BPA 500-kV line that would open up only about 45 miles of new corridor compared to entirely new corridor opened by the Taft South route. This option would utilize the last available slot in the existing lower Clark Fork corridor and cross over into Idaho along Trout Creek. (public)

RESPONSE: In its draft location supplement on the Hot Springs-Bell 500-kV line, BPA examined a number of routes including the one referred to in the comment. Since that time the project has changed somewhat and the route mentioned was dropped by BPA. DNRC examined in detail only those routes mentioned in the BPA draft EIS on the Garrison to Spokane 500-kV line.

Public comment at hearings held by BPA demonstrated strong public opposition to any route through or near populated areas including Gold Creek, Drummond, Clinton, Missoula, Frenchtown, Paradise, Plains, and Thompson Falls. DNRC's analysis in the draft report showed that any route paralleling the Clark Fork would have significant adverse social impacts that would offset any advantages gained by reducing natural resource impacts through paralleling. DNRC's analysis also showed that the Ninemile area (segments 148 and 6 in draft report) posed the greatest potential for adverse impact risk to fish and wildlife.

The advantages of paralleling existing corridors are carefully considered by DNRC, but there are additional siting concerns which may be considered more important locally. See the update section of this final report for further reasons why paralleling does not automatically result in a route of minimum impact.

COMMENT: Instead of selecting the longest and most expensive route (Taft South), the shortest route should be chosen and the \$20-\$30 million saved could be used to underground the lines near populated or delicate areas -- this would solve the Rock Creek problem. (public)

RESPONSE: The shortest route, Hot Springs, would cause more impacts to people than the preferred route. If \$20-\$30 million were saved, it could finance 4-5 miles of undergrounding. Even if the line were put underground through the Rattlesnake residential area, there would still be many areas along the remainder of the Hot Springs route with residences very close to the line. The high cost of the Taft Route is offset by lower impacts to people there.

COMMENT: The interagency recommendation that BPA representatives and the construction contractor should meet with local officials 30 days before the start of construction, should be made to say "should meet before construction starts," because 30 days time is not always available. (BPA)

RESPONSE: DNRC has changed its recommendation to accommodate this concern.

COMMENT: In some places such as wire set-up sites, it will be necessary to use the entire right-of-way width and more. Therefore, wording in the DNRC recommendation that this should occur "in no case" is inappropriate. BPA prefers the phrase "To the maximum extent practical." (BPA)

RESPONSE: DNRC agrees, and the recommendation has been changed.

COMMENT: Since BPA has scheduled right-of-way clearing to commence in May of 1983, and completion of the entire project by 1985, and since we received the BPA's Final EIS a week before termination of the comment period for DNRC's EIS, it is easy to determine that public opinion has very little significance with the BPA. One could also resolve that the hearings set for March 10th and 11th were a matter of formality held merely to fulfill law requirements and that the BPA is more concerned with meeting the construction deadlines than obtaining all necessary data required for appropriately determining their route for the power line. (public)

RESPONSE DNRC acknowledges that the review of this project has been expedited because BPA, as a federal agency, is exempt from procedures of the siting act.

DNRC's draft report briefly explains the complex legal history and uncertain authority of the State of Montana with regard to siting the 500-kV line. However, DNRC began reviewing BPA's draft EIS and related materials in May 1982. Since July 1982, DNRC has collected additional data and conducted an independent analysis of the routes proposed by BPA, local persons, and DNRC. DNRC attended hearings as an observer and evaluated transcripts of 14 public hearings BPA held on the project over the last several years. DNRC held 2 hearings on the Jocko Route in Ovando and Arlee during the fall of 1982. Public comment made at BPA's and DNRC's hearings has played a significant role in the identification of concerns in evaluating and selecting a preferred route. It was public comment and pressure from the Congressional delegation that led to the development of the Taft Route by BPA in 1979-1980.

DNRC used public comment as a basis for its siting concerns. These concerns were defined as issues Montana people care about. The weight given to these concerns was also influenced by how strongly people felt about issues. The issue which received the most public concern was that the line be located away from populated areas. DNRC gave less weight to cultural resources, wildlife and fish but did not consider these concerns unimportant. DNRC recommends stringent mitigation measures to further reduce potential impacts to all resources affected by the 500-kV line and associated access roads, and recommends that BPA reimburse local governments for all expenses incurred as a result of the project and that the Congressional delegation seek passage of legislation to enable BPA to make payments in lieu of taxes.

The Board of Natural Resources and Conservation held hearings on March 10 and 11 to gather comment on DNRC's draft report and the recommendations contained in it. It will consider the comments made at the hearings, written comment, and additional information presented in this report when it makes its decision on a route for the powerline in May.

COMMENT: While reading through the DNRC draft report, we found that recommendations by the DNRC were not consistent with their findings. The report indicates that the Hot Springs Route would:

1. cost \$21,253,000 less;
2. require fewer access roads;
3. parallel existing right-of-way most of the way;
 - a. BPA has already applied for, appraised and paid for right-of-way,
 - b. Tribes have indicated that they are willing to negotiate use of Hot Springs corridor.
4. impose less impact on summer habitat.

On the other hand, the DNRC report indicates that the unsightly power line through the Taft Route will have a devastating affect on:

1. The Western Montana mountains and valleys that are nationally known destinations for outdoor recreation;
2. residents that live here for the opportunities to hunt, fish, hike, ski and enjoy scenery;
3. the line and access roads would conflict with recreation management guidelines and visitor expectations for undeveloped landscapes, even if visual impact is small;
 - a. access roads would render animals more vulnerable to hunting, displace them from favorable habitats and impose stress resulting in decreased wildlife populations,
 - b. unpopular hunting regulations such as shorter seasons and permit hunting would be imposed causing a decrease in revenues available for wildlife management and local economies in the form of license fees and recreation expenditures.
4. Fish populations would be decreased by the use of herbicides, 2,4D, which BPA plans to use will kill aquatic plants that provide food, cover and oxygen to our fish. Yet they recommend the Taft Route over the Hot Springs Route because it would affect fewer homes and fewer people. DNRC was hired by BPA to write BPA's EIS and were not acting in an official capacity for the State of Montana. It is no wonder they disregard the impact on the 9,600 or more tourists, the countless big game hunters and the recreationalists who visit the area affected by the Taft Route. (Mineral County Commission)

RESPONSE: DNRC acknowledges that the Hot Springs Route would affect different resources than the Taft Route. The Hot Springs Route would best reduce project costs and protect fish and wildlife, but it would have an extremely high social impact. DNRC attempted to weight concerns so that adverse impacts from this project directly affect the least number of Montanans. The resource tradeoff can be simply put -- people or wildlife. For this transmission line, DNRC feels that, even with its high potential impact on the natural environment, the Taft Route is preferable for its low impact on people, but this route is not acceptable without extensive mitigation to reduce adverse fish and wildlife and other impacts.

Several of the statements made about the Taft South Route in this comment are not accurate. DNRC stated that access roads may render animals more vulnerable to hunting...and could impose stress. It is not certain to what extent these impacts will occur. If effective mitigation is employed and compensation is made for lost resources, the net loss of wildlife and hunting opportunity would be small.

If mitigation is not adopted or is not effective it is possible that stiffer hunting regulations could result but this is a complex situation that is oversimplified by the statement that unpopular hunting regulations would be the end result.

DNRC is recommending that the Board of Natural Resources and Conservation adopt an extensive set of mitigation measures to protect the state's fisheries and wildlife from adverse impacts that could occur as a result of constructing the 500-kV line. Through careful placement of towers and access roads and stringent mitigating measures designed to protect natural systems, DNRC feels that the Taft South Route will result in minimum adverse impacts on Montana residents and resources.

COMMENT: Recommendation 1 concerns centerline location review with affected landowners. Our concern is that a joint centerline review process has already been established by agreement of the interagency steering committee for the project. The effort is now underway and progressing satisfactorily. Thus we feel there is no need for a separately funded work item outside the framework of the overall environmental study process. (BPA)

RESPONSE: DNRC agrees that joint centerline review is working and reaffirms its commitment to that effort. DNRC's intent was not to seek a separately funded work effort but to continue joint participation wherever needed along the Taft Route to find an acceptable centerline location between federal and state agencies and the affected landowners or managers.

COMMENT: Recommendation 2 concerns construction standards. Our concern is that BPA's construction specifications, including any special provisions unique to the Garrison-Spokane project, will be generally consistent with DNRC's construction standards. There are some differences, however, as detailed in the the written comment. We will work cooperatively to resolve these differences. (BPA)

RESPONSE: DNRC has developed construction standards as a means to reduce potential adverse impacts of constructing the 500-kV line. The Board adopted a similar set of standards for the Townsend to Garrison segment owned by BPA, and the Montana Power Company portion from Townsend to Colstrip. DNRC wishes to resolve differences to the extent possible, but feels that its responsibility is to ensure that the minimum adverse environmental impact standard listed in the siting act is achieved.

COMMENT: Resolution 2 concerns legislation that would allow payments in lieu of taxes. It is BPA's position that legislative issues such as this are policy matters outside BPA's jurisdiction. BPA is concerned, but the resolution of the issue is properly addressed only by the Congress. (BPA)

RESPONSE: Senator Max Baucus testified at the Board's hearing that he intends to introduce legislation allowing BPA to make payments in lieu of taxes. State legislation (HB747) requiring private utilities to pay a beneficial use tax on the power wheeled over tax-exempt federal powerlines larger than 200-kV, would provide tax payments to counties crossed by the BPA lines (see Update section). HB 747 has passed both houses and has been sent to the Governor. Consequently, Resolution 2 has been dropped.

COMMENT: Resolution 3 concerns hiring local workers. BPA agrees with the goal of maximizing local employment. We will continue to encourage our construction contractors to hire local workers. (BPA)

RESPONSE: DNRC acknowledges BPA's efforts on the Townsend to Garrison segment to encourage hiring of local workers. It is DNRC's concern that BPA take an active role in encouraging contractors to hire local workers to the greatest extent possible. This effort would be a benefit to Montana workers and would continue to show BPA's good faith efforts at "being a good neighbor."

COMMENT: Is Montana Power's plans to resubmit its application to build their Great Falls plant yet another reason why all of a sudden the Taft North is being pushed? (public)

RESPONSE: Montana Power Company has filed an application to construct a coal fired power plant near Great Falls. As a private utility, MPC is covered under the Major Facility Siting Act and the project will be evaluated by DNRC through a draft and final EIS. The Salem plant, as it is called, would use MPC's existing transmission system. However, the Taft North and Taft South were selected by the interagency team as the two choices for a route of least overall impact for the BPA 500-kV line.

COMMENT: Residents of Gold Creek feel that BPA definitely led them to believe that the Garrison substation was sited to ensure a southerly route for the line from that point. A route heading north [Taft North] from the substation would be an act of unforgivable bad faith on the part of BPA and the state of Montana. (public)

RESPONSE: Testimony by BPA at the Board hearing in Missoula indicated that no promise was made as to the routing of the powerline westward from the Garrison substation. BPA said it did stress that every effort would be made to minimize the impacts on the community of Gold Creek on any route from the Garrison substation to the west. The location of the Garrison substation south of the Clark Fork in the Gold Creek vicinity does not automatically preclude any route option.

COMMENT: With the shutdowns of the Anaconda operations in Great Falls and Anaconda, the two 230-kV lines that now carry electricity between Montana and the Northwest are essentially unused. These could be used to carry the loads. (public)

RESPONSE: The capacity of the two 230-kV lines is 832 MVA (474 MVA on the Montana Power line and 358 MVA on the BPA line). When the Colstrip plants are in operation in 1985, and when "light load" conditions exist in Montana, a flow of 1,716 MW from Montana to the Pacific Northwest is expected. This is approximately equivalent to 1,818 MVA. Therefore the existing 230-kV lines are not an adequate alternative.

COMMENT: The lines are unneeded due to the expected surplus of power in the Northwest for the next ten years. (public)

RESPONSE: The surplus projected for the next ten years is based on a comparison of loads and generation capacity in the region. Colstrip 3 and 4 are included as a power source in this projection. Without these units, it is uncertain whether there would be a surplus, or even a sufficiency to supply the highly variable loads of the Northwest (see next comment).

COMMENT: Power from Colstrip 3 & 4 is not needed and therefore the line isn't needed. (public)

RESPONSE: Neither the board nor the department has the legal authority to determine in the present proceedings that the transmission line under consideration is not necessary because the power being developed at Colstrip 3 & 4 is "no longer needed." The Board's decision on the need for Colstrip Units 3 & 4 was made in July, 1976. The Siting Act does not provide that the issue of need for the power generation facilities may be reexamined in proceedings dealing with the siting of related transmission facilities. In the matter under consideration, the basis of the need for the facility is two-fold: (1) need as established by congressional act in authorizing the facility; and (2) need as established by the fact that additional transmission facilities are necessary to transport power produced at Colstrip Units 3 & 4 to markets west of the State of Montana, specifically to the Pacific Northwest. The second determination was made by the board in conjunction with its decision to certify the power generating facilities in July 1976.

COMMENT: The 500-kV lines are nothing but expensive backup lines. (public)

RESPONSE: Reliability of service is a major issue in the planning of transmission lines in the Pacific Northwest and elsewhere. A transmission system is designed with sufficient redundancy to be able to withstand certain "contingency" or equipment failure conditions without losing service. To some extent, as detailed in the draft EIS, the proposed line would maintain the reliability criteria set by regional utilities, besides being essential for carrying power under certain projected load conditions.

COMMENT: The lines are an example of "site banking," which violates the Major Facility Siting Act. (public)

RESPONSE: "Site banking" generally is interpreted to mean getting a permit for a facility far in advance of the time construction must begin to meet need. DNRC's analysis showed that a delay of up to five months would probably be costless, but beyond that there was a strong probability of significant and increasing costs. DNRC does not believe, therefore, that this project represents "site banking."

CONSTRUCTION STANDARD CONCERNS

COMMENT: Many of the construction standards contained in appendix B of DNRC's draft EIS overlap BPA's general construction specifications. We believe DNRC's concerns on construction standards must be compatible with BPA's standard construction specifications and should be enforceable in a single contract document. (BPA)

RESPONSE: DNRC and BPA have worked out their differences regarding DNRC's construction specifications (Appendix E).

CHAPTER FOUR -- RECOMMENDATIONS

The Major Facility Siting Act and the siting rules require the Board to consider various criteria and natural, cultural, and human resource concerns in determining whether BPA's proposed transmission line complies with the substantive standards of the Act. The substantive standards are embodied in two levels of consideration the Board must give to the criteria and resource concerns.

First, the Board must compare all the alternative routes to determine which would have the least overall adverse environmental impact, considering the nature and economics of the various alternatives. Toward this end, route comparison issues are summarized in Table 10.

Second, the Board must consider the impacts of the line on each resource and consider how to reduce or avoid these impacts. Optimum reduction or avoidance of impacts (and consequent compliance with the substantive standards of the Act) could be achieved through centerline adjustment, mitigation, monitoring to ensure that mitigation is achieved, and compensation by BPA.

DNRC submits the following recommendations to the Board of Natural Resources and Conservation. Some recommendations were developed by a BPA-DNRC interagency team and these are listed under the interagency recommendation section below. In addition, DNRC developed additional recommendations which generally are more specific. DNRC concludes that adherence to all these recommendations would ensure BPA compliance with the MFSA standards.

INTERAGENCY RECOMMENDATIONS

Route

DNRC and BPA both recommend the Taft South Route as the best option, with the Taft North Route as the second choice. The agencies further recommend that in the event neither of these routes could be used, the interagency team would reconvene to evaluate other routes.

Wildlife

A cooperative interdisciplinary federal/state study team funded by BPA should be formed to determine methods for reducing potential impacts to wildlife. The study should focus on (1) location standards and management of access roads in important wildlife habitat, (2) timing construction to reduce impacts to wildlife, (3) evaluating tower placement in important wildlife habitat, (4) evaluating the feasibility and necessity of compensating for lost wildlife security and/or habitat, (5) developing a program to monitor the implementation of mitigating measures, and evaluating the effectiveness of the measures in reducing impacts to natural resources.

Scenic Impacts

There should be a cooperative federal/state review of project mitigation plans to select and determine the effectiveness of visual impact reduction measures. This review would: (1) determine whether to designate additional sections of the route for tower darkening, (2) identify potential centerline or tower placements to reduce visual impacts, and (3) monitor the effectiveness of the measures.

Roads

A cooperative team of state and federal resource specialists should review project mitigation plans to determine the feasibility of reducing new access road construction and to recommend closing of access roads to protect wildlife, visual values, and other resources.

TABLE 10. COMPARISON OF THB TAFT SOUTH, TAFT NORTH, PLAINS, HOT SPRINGS, AND JOCKO ROUTES

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
<u>Socioeconomic/Aesthetic Impacts</u>					
Numbers of Houses at Various Distances from Centerline					
In right-of-way (ROW)	0	0	0	2	0
ROW to 0.25 mi	16	20	55	130	73
between 0.25 and 0.50 mi	31	26	64	180	88
between 0.50 and 1.0 mi	48	73	90	406	215
between 1.0 and 2.0 mi	217	233	754	1201	1064
TOTAL	312	352	972	2009	1440
<u>Conflict With Specially Managed Areas</u>					
1. Airways					
Bitterroot Airway	x	x	x	2	2
Clark Fork Airway	x	x	x	x	x
Flathead River Airway	x	x	x	x	x
Rock Creek Airway	x	x	x	x	x
2. Recreation Areas					
Blue Mountain Recreation Area	x	x	x	x	x
Rock Creek Recreational Waterway	x	x	x	x	x
3. Trails					
Lewis and Clark	x	x	x	x	x
Stark Mountain	x	x	x	x	x
4. Blackfoot-Clearwater Game Range					
5. Thompson Falls Airport	x	x	x	x	x
6. Tarkio Watershed	x	x	x	x	x
<u>Recreation/Aesthetic Impacts</u>					
1. Recreation Areas					
Rock Creek Waterway	x	x	x	x	x
Clinton	x	x	x	x	x
Planned Dude Ranch	x	x	x	x	x
Blue Mountain	x	x	x	x	x
Bearmouth Chalet	x	x	x	x	x
Lions Campground	x	x	x	x	x
2. Rivers					
Bitterroot	x	x	x	x	x
Blackfoot	x	x	x	x	x
Flathead	x	x	x	x	x
Thompson	x	x	x	x	x
Clark Fork (crossings)	x	3	3	3	3
Clark Fork (parallels)	20 mi	12 mi	12 mi	12 mi	12 mi

TABLE 10.(cont.)

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
3. Fishing Sites					
High-value fishery	4	2			2
Fishing access		2			
4. Lewis and Clark Trail	x	x	x	x	x
5. Nations 1 Bison Range					x
6. Tribal Sacred Areas					x
7. Lakes			x	x	x
Placid				x	x
Salmon				x	x
Rainbow			x	x	x
8. Highway 10A		x	x	x	x
9. Amount of Public Dispersed Recreation Lands Crossed	138 mi	116 mi	136 mi	67 mi	59 mi
<u>Effects on Terrestrial Ecosystems</u>					
Mi of New Access Required	466.9	415.4	401.5	323.5	243.0
Mi of Winter Range Crossed by ROW	45.5	74.0	78.2	71.9	66.0
Mi of Secure Summer Range Crossed by ROW	28.6	27.5	18.4	19.4	25.4
Mi of ROW Crossing Areas Over 6,000 ft	14.7	4.8	8.2	6.4	0.0
<u>Effects on Aquatic Ecosystems</u>					
Mi of Streams in Erosion Risk Category					
high	84.5	83.3	83.2	50.3	37.0
medium	73.1	53.4	34.5	28.2	16.8
low	50.7	79.3	117.3	136.2	123.4
Number of Streams Crossed by ROW in Erosion Risk Category					
high	16.0	11.0	12.0	7.0	5.0
medium	26.0	25.0	17.0	8.0	3.0
low	3.0	7.0	27.0	28.0	22.0
TOTAL New Access Required (in mi)	466.9	415.4	401.5	323.5	243.0
<u>Cultural Resource Impacts</u>					
Mi of ROW Crossing High Impact Zone	7.3	7.7	15.6	12.9	14.3
Mi of ROW Crossing Low Impact Zone	152.6	150.0	163.2	175.7	156.7
<u>Land Productivity Impacts</u>					
Mi of Irrigated or Prime Cropland Crossed*	2.6	4.5	5.8	13.3	16.5
Mi of Nonirrigated Cropland Crossed	1.4	1.5	17.6	26.2	20.1
Mi of Highly and Moderately Productive Timberland	113.5	91.4	118.0	73.1	101.3

TABLE 10.(cont.)

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
<u>Construction Constraints</u>					
MI of ROW Crossing Slopes 16-30 Percent	13.5	18.9	17.1	38.5	27.8
MI of ROW Crossing Slopes > 30 Percent	91.9	96.2	73.3	48.0	43.4
MI of ROW Crossing Problem Soils	47.3	42.1	55.4	64.6	35.9
<u>Residential Land Development Impacts</u>					
MI of Private Land with High or Moderate Residential Development	7.0	19.0	22.0	84.0	46.0
<u>Construction Cost^{**}</u>					
Length of Line in Montana (in MI)	158.8	157.6	173.9	177.4	171.4
Transmission Line Cost (millions)	\$137.2	\$134.2	\$140.4	\$127.4	\$140.7
Substation and Associated Costs in Montana (millions)	\$ 36.7	\$ 36.7	\$ 30.4	\$ 29.0	\$ 29.0
TOTAL Project Costs from Garrison, MT to Bell, WA	\$222.1	\$219.1	\$212.2	\$200.9	\$214.2 ^{**}

*This number represents the greater of the following quantities: presently irrigated land, farmland of statewide importance, and designated prime or unique farmland in Montana.

**Cost figures based on BPA data for segment costs including tower steel and access roads.

**Cost figures developed by DHRC using slope break categories and BPA cost estimates without overhead as listed below. This figure also assumes BPA estimates of substation costs at Hot Springs and Bell substations and transmission line costs from Hot Springs west to Bell. Slope break categories were:

Slopes of 0-15 percent--43.8 mi x \$666,000/mi

Slopes of 15-30 percent--22.5 mi x \$693,000/mi

Slopes of > 30 percent--23.3 mi x \$766,000/mi

Worker Impacts on Communities

At least 30 days before the start of construction, BPA representatives and the construction contractor should meet with local officials to discuss the effects of temporary increases in population in their communities. Such effects would result from the need to provide housing and public services (such as police and fire protection and garbage collection) for workers and their families. This action is intended to reduce community concerns about construction period impacts and provide time and information to prepare for anticipated stresses on local services. If the contractor is not able to meet the 30-day advance notice period, BPA staff should make the initial contacts at least 30 days ahead. If desired by local officials, a second meeting with the contractor should be held before construction starts. BPA representatives should remain in touch with local officials throughout the construction period to determine impact aid requirements for those local governments experiencing increased costs of providing services as a result of transmission line construction.

Maintenance and Repair

BPA should work with landowners to maintain and repair cattle guards, fences, and gates installed by BPA.

Choice of Insulators

BPA should examine the feasibility of using insulator colors other than bottle green to reduce visual impacts.

Right-of-way near Future Residences

BPA should work with county planning agencies to reduce potential for future land use conflicts along the right-of-way, and should seek to discourage land uses that would preclude future use of land adjacent the right-of-way for other utility lines.

ADDITIONAL RECOMMENDATIONS PROPOSED BY DNRC

Recommendation 1

As part of the federal-state Memorandum of Understanding and Memorandum of Agreement, a joint centerline-mitigation-monitoring work group should continue to work out additional specific mitigation measures and develop and conduct programs to monitor their implementation and effectiveness. DNRC recommends that construction on Taft South not begin until an agreeable centerline on public and private land has been identified and the impacts of the line, access roads and substation sites minimized to the satisfaction of the Board. A decision on centerline approval for only a portion of the route should be avoided since it may represent an irrevocable commitment to a corridor. To implement this recommendation, plans for mitigation, compensation and monitoring should be developed within 45 days after the Board's action on this line. These plans shall be submitted to the Board for their review and acceptance. They are as follows:

(A) Specific plans for achieving mitigation for wildlife, fisheries, and wildlife security shall be developed by BPA in consultation with the State. The plan shall include roads designated for closure and/or obliteration, consideration of alternative access road locations, and a timetable and budget for implementation.

(B) To reduce the net impacts of the project, a specific plan for reducing or offsetting unmitigated impacts to wildlife, fisheries, public recreation opportunity, and social or land use impacts shall be developed by BPA in consultation with the State. The plan shall include consideration of establishment of roadless areas for elk security, enhancement of fish habitat, establishment of public recreation areas, and a timetable and budget for implementation.

(C) A specific plan shall be developed by BPA in consultation with the State for monitoring the effectiveness of adopted mitigation measures for the fisheries, wildlife, visuals, recreation, and land use impacts of the project. The plan shall include a timetable and budget for implementation.

(D) That BPA shall establish and fund a road closure and enforcement program in consultation with the State and U.S. Forest Service in accordance with a road closure plan.

Recommendation 2

DNRC recommends that the most effective way to reduce the loss of wildlife habitat security is to reduce road construction or to obliterate and reclaim the road after use. If roads cannot be reclaimed entirely, DNRC further recommends obliterating and reseeding 1/8 mile of the road where it meets existing system roads. The use of gates or other obstructions to prevent vehicular traffic may also be necessary.

Recommendation 3

Maxville

DNRC acknowledges that environmental consequences of AB' are significant and adverse but not sufficient to outweigh the concerns of community residents who would be affected by the line. DNRC recommends AB'.

Recommendation 4

Miller Creek

DNRC recommends further study of the underground and overhead construction alternatives in the Miller Creek/Bitterroot River area (from survey station 3508+02.4 to 4303+47.6). Once this is done, a final recommendation will be made to the Board.

Recommendation 5

Rock Creek

DNRC recommends that the Clark Fork crossing option should be studied in more detail (between survey station 2322 + 275 to 3174 + 42.7). Once this is done, a final recommendation will be made to the Board.

Recommendation 6

The Board's construction standards, (Appendix B) amended to include the recommendations adopted by the Board for this project should be adopted by BPA and incorporated into BPA construction standards. DNRC further recommends that BPA and the State work jointly to develop an operation and maintenance document which incorporates sections 15 and 16 of the Board's standards (Appendix B) into a separate plan.

Recommendation 7

BPA should fund a state construction monitoring program to monitor compliance with the Board's construction standards.

Recommendation 8

Electrical Effects

(A) DNRC recommends a 1.0 kV/m limit for electric field strength at the right-of-way (R-O-W) edge in residential and subdividable areas. This limit would provide an adequate margin of safety to protect public health and would require a R-O-W width of 160 feet. To implement this recommendation, BPA should obtain options to widen the proposed 125 ft R-O-W to 160 ft in residential and subdividable areas. This option may be waived by the property owner.

DNRC intends to commence an administrative rulemaking process to review the issue in the summer of 1983. If that process reveals information that differs with the 1.0 kV/m recommendation, it should be modified at that time.

(B) DNRC further recommends that BPA's proposed 125-ft R-O-W be used on private land not now subdivided, but that options be obtained to widen that R-O-W to 160 feet to preclude future residential development. Any purchase of options should be done in accordance with the wishes of the landowner.

Recommendation 9

Noise

(A) DNRC recommends widening the 160-ft R-O-W to 205-ft in residential and subdividable areas, if the landowner so wishes, to limit transmission line noise to 50 dBA at the R-O-W edge. Land in this category along the proposed Taft South route totals an estimated 7 miles. Designation of a 205 ft right-of-way in residential or subdividable areas would require BPA to acquire options for an additional 67 acres. The 205 ft R-O-W would achieve the 1.0 kV/m electric field level and the 50 dBA noise level.

DNRC intends to review the issue in an administrative rulemaking process in the summer of 1983. If that process reveals information that differs with the 50 dBA in rural areas, it should be modified at that time.

(B) DNRC further recommends that on private land not now subdivided, BPA should be required to obtain options to further widen the 160-ft R-O-W to 205 ft if the landowner so wishes.

Recommendation 10

All beekeepers along the selected route should be informed of the known and suspected effects of electrical fields on bees, and assisted in relocating hives if necessary.

Recommendation 11

To reduce impacts on cultural resources, DNRC recommends a new section be added to the Board's construction standards stating that BPA actions shall conform to recommended treatments for cultural resources defined by the Memorandum of Agreement for the project signed by BPA, Montana State Historic Preservation Office and Advisory Council on Historic Preservation.

Recommendation 12

DNRC recommends that BPA control noxious weeds with biological means to the extent possible in Montana, and use chemical herbicides that are harmless to nontarget plant species where appropriate.

Recommendation 13

DNRC recommends that BPA should designate a local liaison to resolve landowner complaints in each community affected along the selected route. An independent field agent is preferable, but if that is not possible, there should be a BPA field liaison who is responsible for landowner contacts during (1) acquisition of right-of-way easements, (2) monitoring of construction to ensure landowner stipulations are known to the contractor, and (3) negotiation of settlements for damages if needed to reduce potential landowner problems.

Recommendation 14

DNRC recommends that BPA work with local governments and private landowners to minimize duplication of effort and costs to private landowners in controlling weeds along right-of-ways and access roads.

Recommendation 15

DNRC generally supports the Aeronautics Division's recommendations to the Board in this report. DNRC recommends that for all crossings of concern to Aeronautics, there should be a centerline review by DNRC, BPA, and Aeronautics to refine these recommendations on a site specific basis, maintaining aeronautical safety while minimizing long term impacts.

Recommendation 16

DNRC recommends that BPA assist the Aeronautics Division in updating state aeronautic charts to show hazards posed to aircraft by the transmission line, and pay for publishing and distributing updated charts.

RESOLUTIONS

RESOLUTION 1

The Board should consider recommending that BPA encourage its contractors to hire as many local workers as possible.

RESOLUTION 2

The Board should consider recommending that BPA reimburse local governments for all expenses due to construction, operation, and maintenance of the transmission line. A broader interpretation of impact aid to include indirect services such as those provided by city police is needed.

RESOLUTION 3

The Board should consider endorsing efforts of Montana's congressional delegation to introduce legislation that would allow BPA and other federal power marketing agencies to make payments in lieu of taxes.

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APPENDIX A

PROPOSED FISH AND WILDLIFE MITIGATION AND MONITORING

MONTANA'S RECOMMENDED WILDLIFE MITIGATION

I. INTRODUCTION

The preferred Taft Route for the Bonneville Power Administration (BPA) 500-kV Garrison-Spokane Transmission Line crosses large areas of important wildlife habitat in western Montana. The State of Montana/Federal study team selected the Taft South Route because it posed the least adverse impact to residences and private land, although it was the least desirable route for wildlife and wildlands.

Throughout the state and federal siting processes it was recognized that natural resource values were being compromised in order to reduce direct impacts to humans. In view of the recognized impact risk to natural resources, the State/Federal team agreed that it would be reasonable and appropriate to implement measures to reduce impacts to wildlife and fisheries (meetings of November 15 through 19, 1982, Helena, Montana). The team agreed on the following recommendations:

Identify specific measures (and locations) to reduce impacts which result in modification of wildlife habitat. The study will 1) focus on ways to locate and manage access roads, 2) consider proposing construction-timing "windows" in certain areas, 3) specify tower locations in critical areas, 4) evaluate the feasibility of compensation for lost resources and habitat enhancement, and 5) design a monitoring program.

The Federal Steering Committee met in Portland, Oregon, on January 25, 1983, and endorsed the concept and implementation of a mitigation program. It was decided at the Portland meeting that the suggested mitigation program would begin with a cooperative review of project mitigation plans by state and federal wildlife specialists. The review would further determine methods to reduce potential impacts on wildlife. Areas of principal concern would include:

1) Location, standards, and management of access roads in critical areas; 2) recommended construction timing to reduce impacts on wildlife; 3) evaluation of tower placements in critical wildlife habitat; 4) evaluation of the feasibility of and necessity for compensating for lost wildlife security or habitat; 5) development of a program to monitor the implementation and effectiveness of the measures above in reducing potential impacts on natural ecosystems.

In order to proceed efficiently with mitigation strategy endorsed by the Steering Committee, it is necessary to devise a plan outlining methods to be employed. This document explains the details of how the mitigation strategy will be carried out by the state/federal participants.

II. PROJECT PLAN

A. Task 1 - Status Review of the Project Plan

The federal participants on the project (primarily U.S. Forest Service and BPA) have been defining the proposed location of towers and access roads. They also have been conducting a reconnaissance of the proposed corridor to locate areas of concern relative to wildlife and habitat. Forest Service biologists have proposed various mitigation measures to reduce site-specific impacts. DFWP has also

suggested mitigation where information on road and tower locations have been mapped. The state's effort has been limited by the lack of specific tower and road information for significant portions of the right-of-way.

As part of the federal procedure on the project, BPA and the Forest Service entered into a Memorandum of Understanding calling for preparation of a mutually acceptable plan for construction of the project on national forests. The Forest Service has prepared a Project Plan for the portions of the Garrison-Spokane transmission line that cross the Deer Lodge and Lolo national forests.

The Project Plan is intended to serve as permanent documentation of impact reduction efforts and as a field guide to construction personnel. The Project Plan addresses such concerns as:

- 1) Timber disposal
- 2) Clearing and slash disposal
- 3) Road construction, use, and maintenance
- 4) Erosion control and restoration
- 5) Wildlife
- 6) Visual mitigation
- 7) Sensitive areas
- 8) Range
- 9) Watersheds and water quality
- 10) Fire prevention and suppression

The Project Plan will be modified as a result of mitigation suggested by Forest Service biologists and other resource specialists. Field personnel have suggested changes in tower location and design to reduce impacts. Mitigating measures such as revegetation and road closures also have been suggested. To date the state has not been able to get an accounting from the Forest Service as to which mitigation measures will be enacted and which will be rejected.

Biologists and other resource specialists from DNRC and DFWP (hereinafter referred to as the State Team) will review the Forest Service Project Plan and suggest changes as necessary to ensure consistency with state policy and management objectives. Suggested change in tower location and design and site-specific mitigating measures relevant to wildlife will be reviewed and formally commented upon in written memoranda by the State Team. The status of the suggested changes and site-specific mitigating measures proposed by the Forest Service will be determined through consultation with BPA and the Forest Service. The State Team's evaluation of the Forest Service/BPA mitigation suggestions will be submitted to BPA and US Forest Service representatives for review and comment to ensure that the State Team has clearly understood BPA/Forest Service mitigation strategies. Later reports will be made as information becomes available and is reviewed.

B. Task 2 – Additional Mitigation Measures

After a review of the suggested BPA/Forest Service mitigating measures and Project Plan, the State Team will study the proposed route to determine where additional site-specific mitigating measures may be necessary to reduce impact risk. The State Team will study road and tower locations on all state, federal, and private land affected by the project to determine what mitigating measures are needed. Proposed stream crossings also will be studied so management systems can be devised to reduce riparian and aquatic impacts.

Any mitigating measures considered for private land would be discussed with the landowner to ensure they are acceptable. Mitigating measures suggested for state and federal lands will be discussed with the managing agencies.

ALL mitigating measures and siting changes suggested by the State Team will be described in written form with appropriate maps and submitted to the Ecological Services Division (DFWP) and Mitigation Coordinator (DNRC). After DFWP and DNRC determine the changes to be acceptable, they will be sent to BPA under the joint signatures of the Administrator of the Ecological Services Division (DFWP) and Administrator of the Energy Division (DNRC). BPA will be expected to respond to the suggested siting changes and mitigation within two weeks of receipt of the suggested changes.

C. Task 3 - Assessment of Unmitigated Impacts

Damage to wildlife and wildlife habitat is unavoidable even though mitigating measures may reduce adverse impacts. Unavoidable damage can be rectified in various ways, however. One means is through enhancement of habitat in one area to make up for losses in another area. Another means is through acquisition of habitats similar to the damaged habitat or by obtaining a firm commitment to manage other public land for the benefit of affected species and to balance impacts among all affected resources. In other words, wildlife should not bear a disproportionate share of the impacts.

Before it can be determined whether easements or some other measures should be enacted to compensate for losses that cannot be mitigated, it is necessary to determine as accurately as possible the magnitude and character of the losses. Losses that will be evaluated include:

- 1) Losses of habitat due to access roads, substations, towers, and transmission right-of-way.
- 2) Loss of big game security due to construction, operation, and maintenance of access roads.
- 3) Loss of carrying capacity of the habitat for certain sensitive species.
- 4) Loss of hunting opportunity.

The plan would include accurate descriptions of the resources affected (location; population characteristics; habitat features; economic, biological, scientific, and/or recreational importance) and specific recommendations for offsetting unmitigated impacts. The recommendations would specify areas to be designated for special management (i.e., big game security, high value streams, and road closure and/or reclamation).

The plan to compensate for unmitigated losses to wildlife and fisheries would be submitted to the Board in July 1983. The interagency team would meet with the Board, if requested, to elaborate on or answer questions concerning the recommendations.

d. Task 4 - Implementation of Compensation Measures

The compensation plan would be implemented after acceptance by the Board.

E. Task 5 - Monitoring

A monitoring program would be conducted to assess the effectiveness of mitigation and compensation measures. The program would be designed and conducted by biologists from DFWP. The Forest Service would review and comment on the monitoring program and BPA would fund it. The program would focus on:

- 1) The effectiveness of road closures in maintaining elk security.
- 2) The influence of new access road construction on hunter opportunity and hunting quality.
- 3) The influence of the project on big game use of winter range and thermal cover.
- 4) The long-term sedimentation risk to streams posed by the project.
- 5) Shifts in historic big game habitat use patterns that may result from the project.
- 6) Revegetation success.
- 7) Other aspects of the project deemed appropriate by the interagency team.

Annual reports describing monitoring results would be submitted to the Board. The annual reports would be compiled by DFWP and DNRC in consultation with BPA and would be submitted to the Board in October of every year for the life of the project or until DFWP and DNRC determine that the monitoring program should be terminated.

F. Work Schedule

The work schedule would be conducted as shown in Table 1. This schedule is designed with the assumption that right-of-way clearing and road construction will commence in May, 1983.

FISHERIES/STREAM HABITAT/MONITORING

I. PROBLEM

The preferred route selected for the proposed 500-kV transmission line from Garrison substation to Taft could have severe adverse impacts on the stream habitats and fisheries. A number of tributaries to the Clark Fork and St. Regis River will be crossed. These tributaries provide important spawning habitat for migratory trout and most sustain viable resident fish populations.

Forest Service route survey information points out many areas with unstable soils (see Attachment A). Further, the route document indicates there will be many new and reconstructed creek crossings on the several hundred miles of new roads. Roading and other construction activities associated with stream crossing tend to permanently increase sedimentation and could damage stream banks and ultimately fish habitat. Even with implementation of best management practices, some unavoidable impacts could occur.

Current information on fish population, fish habitat, and water quality is not available for many of the affected streams. This information is necessary to assess unavoidable losses and to suggest mitigation or compensation measures.

II. STUDY OBJECTIVES

The objective of this proposed study is to determine what effects BPA powerline stream crossing activities have on stream habitat, water quality, and fisheries.

To satisfy this objective, fishery, stream habitat and water quality information will be collected at a number of powerline stream crossing sites. Moving eastward from the Idaho border, proposed study locations include Randolph, Timber, Savanac, Twin, West Mountain, Nemote, Tank, Albert, Tyler, Harvey, Eightmile, and Boulder Creeks. Alternative or additional locations may be sampled if circumstances warrant. Specific tasks include:

- (1) Resident trout population will be estimated.
- (2) Fish species composition and distribution will be determined.
- (3) Use of the stream by migratory spawning fish will be assessed.
- (4) Stream reach characteristics and channel stability will be inventoried.
- (5) Turbidity, total suspended sediments, pH, alkalinity, water temperature, and stream flow will be monitored.

All parameters will be evaluated prior to and after the powerline is in place and both upstream of and downstream from the crossing site. Unavoidable losses will be quantified and mitigating measures will be suggested.

III. METHODS

Fish population surveys will be done using standard electrofishing techniques such as Smith-Root backpack shocker or bank shocker. Where fish population estimates can be obtained, the Chapman modification of the Paterson mark-recapture technique will be used.

Stream reach inventory and channel stability evaluation would be performed using the Region 1 U.S. Forest Service Watershed Management Procedure.

Water temperatures will be measured with a standard mercury thermometer. Turbidity will be measured using a Hach Model 2100A Turbidimeter. Suspended sediments would be measured by a depth integrated sample using field methods developed by the U.S. Geological Survey (USGS). A Hach Model DR-EL, direct reading, portable Engineer's Laboratory would be used to measure alkalinity (as CaCO_3) and determine pH by titration. Stream flow would be measured using standard USGS methods.

IV. STUDY TIME AND COSTS

This project would begin April 15, 1983, and run through October 1984. Project results would be presented in a final report at the end of the project.

ATTACHMENT A

Robert Meuchel, a Forast Service hydrologist, wrote in a memo to the Project File that the cantarina and access roads between angle distance point 35 and angle point 37 have serious soil/water problems. Creeks that would be aduersaly affected include: Rock Craak, Twin Craak, Savaanac Craak, and Timber Craek. Meuchel stated in the memo:

From a soil/water standpoint this is the most sansitive continuous saction of line so far evaluated on the Forest. Soils are erosive and structurally difficult to work with. This area lies in a 55" precipitation zone with 65-70% falling from October-March. Use of roads in this area during winter and spring break up periods will require unique design considerations in order to avoid severe roadbed damage, erosion, and sedimentation. Road drainage featuras will have to consider several feet of snow adjacent to roadway. Snow plowing will increase roadside snow depth and may compact snow, effectively praventing the dispersion of drainage water. There are five major stream crossings and many smaller ones. Unless drainage structures are kept open, these draws and streams may be the only outlet for road surface water.

Existing road soils could "eat" considerable quantities of surfacing material. Special precautions to ensure drivable road may includa the use of filter cloth beneath the surfacing material or a built up roadway using a considerabla depth of coarse base material.

Other information in the Project File states that the construction, operation, and mantenanca of the Taft substation and associated roads pose a serious risk to Randolph Creek. Problems with the substation include:

- 1) A septic system treatment will be requirad at tha site which may result in some drainage or seepage into Randolph creek.
- 2) Several thousand gallons of oil will be storad on site. Emergency catchment and containment structures will be required.
- 3) The substation site will ba treated with an herbicide soil sterilant that could contaminate the stream and prevent soil stabilization.
- 4) Reconstruction of the road that now parallels Randolph Creek will require extensive cuts, fills, and hillside excavation. Construction will jeopardize riparian areas and the stream channel.
- 5) Snow removal will be a problem with respact to potential stream channal drainage. Plowed snow may accumulate over the stream and form a snow bridge many faet thick. Collapsa of the snow bridge could craate channel movement and/or road fill damage.

APPENDIX B
DESCRIPTION OF RARE II AREAS CROSSED
RARE II CORRESPONDENCE

RARE II AREAS

Following is a brief discussion of the five areas crossed by Taft South and the apropoosed managment diration of each.

Silver King. The largest of the five areas with 46,200 acres, Silver King is located in the John Long Mountains. Its western border is Rock Creek and the existing Welcome Creek Wilderness Area, and its southwestern border is the 60,000 acre Quigg Mountain area, recommended for wilderness designation in the RARE II process. The northeast corner is 1.5 miles from I-90 and the Clark Fork. This area provides secure summer habitat for about 200 elk.

Silver King lies partly in the Lolo National Forest and partly in the Deer Lodge National Forest. The Lolo National Forest issued a draft EIS containing its proposed forest plan but work on the final EIS and other forest plans has been stopped until resolution of the RARE II issue. The Taft South route would cross land managed by the Deer Lodge National Forest, which has not yet issued a draft EIS on its management proposal for the area. The part of Silver King managed by the Lolo Forest would be managed for timber and wildlife if the draft EIS recommendations were followed. The Taft South route would cut across three miles of Silver King, severing its northwest corner from rest of the area. Moving the line to avoid the area would require a new siting study (see Figure 17).

Stark Mountain. This 10,400 acre roadless area in the Lolo National Forest between the Ninemile and Clark Fork valleys is bounded on the east by the Stark Mountain roadless area. Its southern border is within 1 mile of I-90 and the Clark Fork. This area is important winter range for deer and elk.

The Taft South route would pass through about 3.5 miles through a portion of this area the Forest Service proposes to manage for timber and wildlife. Three-quarters of a mile of a visually sensitive area would be crossed and the transmission line, even with mitigation for visual impacts, would not meet the Forest Service's visual quality objective for this area.

The area would be difficult to avoid by centerline selection because it would require siting the powerline in the Ninamile Valley (along a route studied and rejected by the federal team) or paralleling I-90 and the Clark Fork in steep terrain (see Figure 18).

S. Siagel S-Cutoff. This 19,000 acre area in the Lolo National Forest borders the Clark Fork east of St. Regis. The Taft South route would cross about three miles of land the Forest Service proposes to manage for timber and wildlife and three-quarters of a mile that would be managed for visual quality goals. This area is important deer and elk habitat.

The area could be avoided only by using a route that was rejected because of impacts to the town of St. Regis and a state recreation site on the Clark Fork (see Figure 19).

Cherry Peak. The northwestern border of this 23,600 acre area in the Lolo National Forest is Highway 200 and the Clark Fork. Its southern edge is the Camel's Hump road. The Taft South route would cross about two miles at the south end of the area through land proposed to be managed for timber production. This area is important for elk summer security.

Centerline relocation could avoid the roadless area but the Camel's Hump road, a dispersed recreation area, and other resources would be adversely affected (see Figure 20).

Mt. Bushnell. Westernmost of the five areas is a 18,900 acre tract lying north of I-90 in the Lolo National Forest. The Taft South route crosses about three miles of the area that the Lolo Forest plan proposes to manage for timber production. The area could be avoided by moving the line to private land to the south, but the potential for adverse impcts could increase (see Figure 20).

UNITED STATES DEPARTMENT OF AGRICULTURE
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FEDERAL BUILDING
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MISSOULA, MONTANA 59807

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MONT. DEPT. OF NATURAL
RESOURCES & CONSERVATION

APR 1 1983

Laurence Siroky, Administrator
Department of Natural Resources and Conservation
Energy Division
32 South Ewing
Helena, MT 59620



Dear Mr. Siroky:

I am replying to your March 15 letter requesting information regarding the crossing of inventoried RARE II nonwilderness areas Nos. 424, 791, 795, and 800 by the Bonneville Power Administration (BPA) proposed 500 KV transmission line. Specifically, you were interested in changes to the RARE II process as a result of the recent Ninth Circuit Court of Appeals California vs. Block decision. Our current direction related to activities in RARE II areas is summarized below.

Activities already ongoing, scheduled, or authorized under existing multiple use, unit or resource plans may continue. Areas determined to be available for nonwilderness uses in RARE II or the unit planning process that remain essentially roadless and undeveloped shall be subject to additional evaluation in the current Forest planning process for potential wilderness designation or continued availability for nonwilderness uses.

Existing plans for the RARE II areas crossed by the proposed transmission line do not preclude consideration for transmission lines. Therefore, the areas in question can be considered for crossing by any routing alternatives.

If it is necessary to address the RARE II issue through the Forest planning process, our work will not be completed until some time in calendar year 1984.

Changing the present routing alternatives to avoid roadless areas will require not only an evaluation to reroute around a specific area, but probably a reassessment of the entire route.

Sincerely,


TOM COSTON
Regional Forester

State of Montana
Office of the Governor
Helena, Montana 59620

TED SCHWINDEN
GOVERNOR

March 21, 1983

The Honorable John Melcher
United States Senate
730 Hart Office Building
Washington, D.C. 20510

Dear Senator Melcher:

On January 13, 1983, I had the opportunity to visit with John Crowell, Assistant Secretary of the U.S. Department of Agriculture, and Tom Coston, Montana's Regional Forester. Mr. Crowell explained the concern of the Reagan Administration over the recent California RARE II decision by the Ninth Circuit Court of Appeals. He asked for my support of national sufficiency legislation the Reagan Administration might propose. The Assistant Secretary further urged me to solicit your support of the Administration's proposals. (You may recall that I requested your support in a letter dated December 22, 1982.)

The Governor's Ad Hoc Committee of Forest Resources, which I formed on March 12, 1982, now meets regularly to discuss and to make recommendations on issues affecting Montana's forests. A list of the committee members is enclosed.

At the February 16, 1983, and the March 16, 1983 meeting of the committee, it unanimously recommended that I support a statewide RARE II bill that would use Governor Judge's 1979 RARE II wilderness recommendations as a starting point. The committee further recommended that the legislation include areas for non-wilderness release and specific sufficiency language for Montana's RARE II process. Finally, the committee also recommended the Lee Metcalf Wilderness Bill (SB 96) remain independent of the RARE II omnibus bill and proceed as separate legislation.

The future of the land studied under the RARE II process is up to Congress. I recommend that you support legislation which would accomplish three goals: 1) ratify the RARE II process in Montana, through state-specific sufficiency language; 2) propose wilderness classification for those deserving areas identified in RARE II; and 3) provide release language for those deserving areas recommended as non-wilderness under RARE II.

Most Montanans want to see the RARE II process concluded and prefer to avoid a RARE III. My staff and the Forest Resource Committee are available to assist you and your staff in developing the language, defining the deserving areas and promoting broad-based support for an omnibus wilderness bill.

Page two
March 21, 1983

I am confident a sufficiency, designation and release omnibus bill can be drafted, debated and passed with a minimum of controversy. We can no longer afford the luxury of indecision, debate and delay. I look forward to hearing from you.

Sincerely,

TED SCHWINDEN
Governor

Enclosure

cc: John Crowell
Tom Coston
Ad Hoc Committee on Forest Resources

December 22, 1982

The Honorable Pat Williams
United States Representative
United States House of Representatives
1512 Longworth House Office Building
Washington, D.C. 20515

Dear Congressman Williams:

I am concerned about the implications of the Ninth Circuit U.S. Court of Appeals' October 22, 1982, decision entitled State of California v. John R. Block, DC #CV79-523-LKK, dealing with the adequacy of the Forest Service RARE II Final Environmental Impact Statement. The court's opinion raises questions about the legal propriety of the EIS to place national forest lands in a non-wilderness category to be managed for production of goods and services that the nation, local communities and many individuals depend on.

The State of Montana expended a great deal of effort and resources in the RARE II process. Montana and the federal government were in close agreement with the recommendation to add 631,000 acres of the national forests in Montana to the National Wilderness System; to place 1,275,000 acres (including the nine study areas of the Montana Wilderness Study Act) into a "further planning" category to be resolved later; and to "release" 3,100,000 acres to be managed under the broad direction of multiple use. The "released" lands would be subject to careful land management planning in which the effects of management strategies on the state would be carefully considered and the state having an opportunity to participate actively in the process.

Re-opening the RARE II decisions is of little constructive value. I am convinced that the outcome would differ little from the present results of RARE II...results that have been reasonably well accepted in this state.

Legislated "release" language to statutorily declare the RARE II non-wilderness lands available for planning and management has been publicly discussed for some time. Montana, like most other states today, is faced with the most difficult economic and social problems in decades. In these times of fiscal austerity, we have no desire to devote our energy and resources to re-address questions that have already been sufficiently answered. I urge that you proceed with action to develop and process the legislation necessary to accept the results of RARE II and permanently end this controversy.

Sincerely,

TED SCHWENDEK
Governor

cc: Rich Bechtel
Tom Coston

bcc: Tim Gallagher

TS/GALLAGHER/cj
File: CORRESPONDENCE CONCERNING FEDERAL LEGISLATION

APPENDIX C
FAA HAZARD MARKING SPECIFICATIONS

FEDERAL AVIATION ADMINISTRATION HAZARD MARKING SPECIFICATIONS (USDOT 1976)

MARKERS. Markers should be used to mark obstructions when it has been determined that it is impractical to mark such obstructions by painting. Markers may also be used in addition to aviation surface orange and white colors when it has been determined that such markings should be used to provide protection for air commerce. They should be displayed in conspicuous positions on or adjacent to the obstructions so as to retain the general definition of the obstruction. They should be recognizable in clear air from a distance of at least 1,000 feet (305m) in all directions from which an aircraft is likely to approach. They should be distinctively shaped so they are not mistaken for markers that are used to convey other information. The shape should be such that the hazard they mark is not increased.

- a. Spherical Markers. Spherical markers are normally displayed on overhead wires. Markers may be of another shape, provided the projected area of such markers will not be less than that presented by a spherical marker.
 - 1) **Display.** At least one such marker should be displayed at equal intervals for each 150 feet (46m), or fraction thereof, of the overall length of the overhead line and not lower than the highest wire. The distance between markers may be increased to not more than 600 feet (183m) when the overhead wires are located more than 15,000 feet (4,575m) from the nearest landing area. Where there is more than one overhead wire on which the spheres can be installed, the spheres may be installed alternately along each wire as long as the distance between adjacent spheres meets the spacing standard. This allows the weight and wind loading factors to be distributed.
 - 2) **Size and Color.** The diameter of the markers should not be less than 20 inches (0.5m) and should be colored aviation orange.

APPENDIX D

TESTIMONY OF PAUL STOLEN, DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
BEFORE THE BOARD OF NATURAL RESOURCES AND CONSERVATION
MARCH 10, 1983

TESTIMONY OF JACK LEE, BONNEVILLE POWER ADMINISTRATION
BEFORE THE BOARD OF NATURAL RESOURCES AND CONSERVATION
MARCH 10, 1983

Testimony of Paul Stolen, Special Projects Coordinator

Good afternoon, Mr. Chairman, members of the Board, and Mr. Brown. My name is Paul Stolen, and I am Special Projects Coordinator in the Facility Siting Bureau at DNRC. I am the staff person responsible for reviewing the electrical and biological affects of BPA's 500 kV Line. I will provide you with a short review of those subjects that DNRC concentrated on since the Board hearings on the Townsend to Garrison portion of the line. These efforts had to do with possible effects of the proposed facility on the public health, welfare, and safety, and noise impacts, as defined in the Major Facility Siting Act.

First, I would like to give a short review of the electrical effects of high voltage AC transmission lines, and the environmental impacts that may result. These effects can be divided into two general categories, corona effects and electromagnetic field effects.

Corona is the phenomenon of air ionization at the surface of conductor wires, or the bleeding of energy to air. It can be seen as visible light during darkness and occurs on the conductor surface where irregularities are present, such as water droplets from rain or fog, ice or snow crystals, or nicks and scrapes.

Three sorts of impacts are associated with electrical corona — first, noise, which consists of hissing or crackling. The noise is not loud enough to cause health problems, but is definitely loud enough to be a nuisance to some people nearby. I will address this topic later in this testimony.

A second corona-caused impact is interference with television and AM radio reception. During the siting of the Townsend to Garrison portion of the transmission line, BPA and the Board agreed on mitigating measures to reduce this impact. The recommendation in DNRC's draft report on Garrison-West is the same as the one agreed to for the Townsend to Garrison segment.

A third effect of corona is production of ozone and nitrogen oxides from the breakdown of air. Both gases are recognized air pollutants for which air quality standards exist, but there is broad scientific agreement that neither is produced in quantities approaching legal standards, and frequently concentrations are too low to measure.

The other general category of transmission line electrical effects besides corona, electromagnetic field effects, is a consequence of the complex pattern of electric and magnetic fields that surround an alternating current transmission line. The field strength drops off rapidly as one moves away from the line, but doesn't reach background, or natural level, until about one-half mile from the line. To put this figure in perspective, however, household appliances and wiring produce electric fields equivalent to transmission line fields found about 300-400 feet from the centerline. In other words, a person standing about 350 feet away from the line is being exposed to a field commonly found in houses. One of the possible impacts of these electrical fields is effects on honeybees. The Garrison-West draft report needs clarification on this point because of an error on p. 71, Recommendation #5. No adverse effects on honey production are expected if BPA follows the construction guideline on p. 96, which has been agreed to.

Three sorts of effects are associated with transmission line electromagnetic fields. These are, first, sparks and currents received by people when they touch an underground object, such as a vehicle parked under the line. Currents are also induced in poorly grounded fences, or in metal buildings. Most shock hazards can be prevented by engineering practices such as grounding of metal objects, and prudent operation of equipment under or near the transmission lines. BPA undertakes these precautions and informs landowners and equipment operators of the potential hazards.

A second possible impact from electromagnetic fields is effects on some older models of cardiac pacemakers that don't respond properly in an electrical field. This should not be a problem because cardiac pacemakers have been redesigned to protect against most such effects. Wearers of pacemakers are also informed by doctors of precautions, which are similar to precautions taken around electrical appliances.

A third impact category is biological effects, including possible effects to human health. DNRC concluded during studies of the Townsend to Garrison segment that evidence indicates biological effects sometime result from electrical fields that occur in the vicinity of the transmission line.

Two contracts were entered into by DNRC to study corona and electromagnetic effects after the Townsend to Garrison hearings. BPA commented on the scope of work for these contracts, and agreed that DNRC choices were well-qualified. Because of the high degree of public concern about health issues, and because some of the routes being considered by BPA west of Garrison involved locating the line close to people, the intent of both contracts was to determine as precisely as possible the zone of impact to people.

The first contract, which was concerned with noise impacts, was with a firm specializing in the engineering aspects of high voltage lines, which I will refer to as the ERM Report. The task was essentially to attempt to determine the nuisance noise zone around the line, especially in quiet, rural areas.

It should be stressed that the corona-produced noise I am referring to occurs only during wet or snowy weather, and is at a level where it causes annoyance, and not a more serious impact. Based on information in the ERM Report, the following criteria are useful in determining the potential nuisance noise impacts:

- (1) BPA has designed the 500 kV conductors to produce as little corona as possible, given economic factors;
- (2) widening the right-of-way is a reasonable method of preventing construction of residences in locations where the intermittent noise occurs, and this method has been used elsewhere;
- (3) nuisance noise impacts can be predicted on the basis of public opinion surveys about annoying noises and public complaints in the vicinity of transmission lines, and on two kinds of laboratory research on noise, interruption of sleep, and interference with speech;
- (4) several measures of estimating noise impacts result in the prediction of nuisance noise levels outside the right-of-way during wet weather;
- (5) there is not sufficient data to determine how annoyed people accustomed to rural environments would be;

(6) Montana has no statewide noise standards that could be used as guidance in determining acceptable future noise levels referred to in the Major Facility Siting Act. If EPA nationwide data are used and adjusted for the additional annoying characteristics of corona noise, the EPA-recommended noise limit for residential areas and farms is met at 70 feet from BPA's right-of-way edge, or at the edge of an alternative 265-foot right-of-way. Use of the other measures of predicting impact described in number three could result in a wider right-of-way.

The second contract entered into by DNRC since the Townsend-Garrison hearings was with Dr. Asher Shappard, a health physicist who is a recognized authority on the biological effects of electromagnetic fields and who has been an advisor to BPA. His task was to determine if there is any potential for impacts to human health from the proposed line. You have been given a copy of this report, which I will refer to as the "Sheppard Report." The main findings are as follows:

1) Several different kinds of biological effects have been reliably demonstrated in electric strengths and frequencies relevant to human exposure in the environment of the proposed 500 kV transmission line.

2) The mechanisms that underlie the observed effects are not known.

3) While effects do occur, and a large amount of research has been undertaken, the effects are not known to result in ill health to people or test animals. This conclusion is based on a large amount of research on test animals. Data on human health effects are far less definitive.

4) The maximum electric fields caused by the line would not pose an acute health and safety hazard inside or outside the right-of-way such as might occur from induced currents in vehicles, so long as usual good engineering and construction practices are followed.

5) The scientific evidence indicates that the electric fields produced near the proposed line are strong enough to require regulation to limit chronic exposure of the public. The Sheppard Report recommends that the electric field be limited to 1 kilovolt per meter at the edge of the right-of-way, and that if this is done, there is little likelihood that a person chronically exposed would suffer any adverse effects. The proposed line has 1.8 kilovolt per meter electric field at the edge of the right-of-way.

6) Selection of an electrical field limit involves subjective elements because the scientific evidence does not define a precise limit. These subjective elements are discussed in the Sheppard Report.

The findings of the ERM Report on noise impacts, and the Sheppard Report on biological effects, both lead to a recommendation for a wider right-of-way in some portions of the line. The following considerations are relevant to the selection of an appropriate width:

1) Based on evidence DNRC had available at the time, the Board required that BPA avoid existing residences within an additional 75 feet of the right-of-way edge on the Townsend-Garrison segment of the transmission line.

2) The BPA uses the criteria contained in the National Electric Safety Code (NESC) to select a right-of-way width. This is standard practice in the utility industry, but it is also a common practice to use environmental criteria such as induced currents in people and other biological effects in special circumstances, especially for lines above 345 kV.

3) There do not appear to be any uniform right-of-way width standards in use around the country for any size of transmission line, and selection of a width for any particular line involves subjective elements. It is common practice to avoid residences as much as possible during route selection.

4) Use of biological effects criteria of 1 kilovolt per meter as recommended in the Sheppard Report would require about a 160-foot right-of-way. This is a preliminary estimate.

5) Use of a noise impact criteria based on the ERM Report would require a 265-foot right-of-way.

6) Use of the biological effects or noise impact environmental criteria need only apply to the right-of-way in residential or subdivision areas. There are about 7 miles of land in this category along the Taft South route.

7) There are precedents for limiting the electrical field to 1 kilovolt per meter. DNRC's draft Garrison-West report (page 52) needs clarification on this point. The New York Public Service Commission required a right-of-way width for a 765 kV line that resulted in a 1 kilovolt per meter electrical field at the edge, rather than 1-2 as the report states. Similarly, the California Energy Commission required a right-of-way width for a 230 kV line that resulted in a 1.1 kilovolt per meter maximum at the right-of-way edge.

8) DNRC is conducting a survey of electrical field levels at the edge of transmission lines of 161 to 500 kV. Preliminary findings are that the design of most new transmission lines of 345 kV and less results in fields of less than 1 kilovolt per meter at the edge of the right-of-way. For example, two 230 kV lines that the Western Area Power Administration is planning for Montana will have a maximum edge of right-of-way field of .6 kilovolt/meter. This would indicate that the 1 kilovolt limit is reasonable.

Thank you.

Testimony of Jack Lee, BPA

My name is Jack M. Lee and I would like to comment on the area of electrical and biological effects. I am a biologist and have worked for BPA for 10 years. My job is to conduct investigations of the environmental effects of high voltage transmission lines. This includes overseeing BPA sponsored research and conducting an ongoing review of the literature related to the effects of transmission lines on plants, animals, and people. I am assisted in these efforts by a special team established in 1974 and by other BPA personnel who are specialists in high-voltage transmission. In addition we meet frequently with researchers in the U.S. and from other countries.

In 1975 BPA was one of the first in the United States to provide a report for the public on what was known about electrical and biological effects of transmission lines. Since then, we have revised the report in 1977, 1978, and 1982 as new information became available. The 1982 report is to my knowledge, the most recent comprehensive report of its kind available. A primary purpose of the report since 1975 has been as a support document for BPA impact statements for new transmission lines. Like most 500-kV projects, scoping for the Garrison-Spokane line indicated high public interest about electrical and biological effects. The draft EIS, therefore, included a summary of the most recent worldwide research and referenced other BPA reports for background. This information was further updated in the final EIS. In addition to revising our electrical effects booklet in 1982, we also prepared a special booklet explaining electrical effects that was distributed during 14 public information meetings on the draft EIS. The continuing review of information on over 20 years of research from around the world indicates there is no evidence that the electrical effects of 500-kV lines pose a threat to human health. This is not just a BPA conclusion. This is also the conclusion reached by numerous other reviews done by State and Federal agencies and other groups and individuals in the U.S. and other countries. This includes a review recently released by the World Health Organization which concluded that transmission lines of 400-800 kV do not constitute a danger to human health. The ONRC analysis as summarized in the draft report also concluded that 500-kV lines have caused no known effects on the health of animals or people. The ONRC draft report also stated that confirmed effects in laboratory animals have been minor. ONRC based their analysis of electrical and biological effects on two reports prepared for them by independent contractors.

The independent reviews described essentially no new areas of research that were not previously addressed by BPA in the EIS or supporting documents. This shows that BPA has openly and fully provided information on electrical and biological effects to the public.

I would now like to summarize our comments on the electrical and biological effects material in the ONRC report and in the two contractor reports. This will include providing additional information that is not in the ONRC draft, which we believe is important to a balanced treatment of some controversial subjects. First of all, there appears to be general agreement between the BPA and ONRC analyses that there are no significant problems related to cardiac pacemakers, ozone, shocks from induced voltages, and radio and television interference. ONRC recommendation No. 6 [p. 71], that pertains to mitigation of radio and television interference is consistent with BPA policy. Also, BPA provides a booklet to the public that discusses precautions for avoiding shocks around powerlines. Regarding honeybees, effects can be easily prevented so reimbursement for possible honey losses contained

in DNRC recommendation No. 5 (p. 71) is not necessary. Based on previous recommendations by DNRC on the Townsend-Garrison line, BPA has prepared information for beekeepers that describes results of honeybee research and explains how effects can be prevented. It should be pointed out that effects on bees are related to electrical currents induced inside wooden hives, not to the electric field outside the hives.

A report prepared for DNRC by Mr. Dietrich confirmed the accuracy of BPA's method for predicting electric field strength levels. The maximum field strength for the proposed 500-kV double circuit line will be 7.8 kV/m. In practical situations, with planned line loading, the maximum field will be less.

There are over 15,000 miles of 500-kV lines in the U.S. that operate with maximum fields of 7 to 9 kV/m. In the eastern U.S., 765-kV lines produce maximum electric fields of 10-12 kV/m. The report prepared by Dr. Sheppard for DNRC indicated that pathological effects in humans exposed to electric fields at any field strength are unproven and speculative. In addition, effects confirmed in some studies of laboratory animals are subtle and do not affect health, reproduction, or growth. It is generally agreed that further research is needed to clarify mechanisms associated with the subtle effects that have been reported. The Sheppard report concludes that the maximum fields on the proposed 500-kV right-of-way pose no health hazard to people using the right-of-way as long as BPA continues to control shocks from metallic objects.

Although the above conclusions are consistent with the BPA analysis, the DNRC report does not justify recommendation No. 4 (p. 70) that calls for a 1 kV/m limit at the edge of the right-of-way. The proposed 500-kV double-circuit line as designed would produce 1.8 kV/m at the edge of a 125 foot right-of-way. As I will point out shortly, 1 kV/m is less than produced by many lower voltage lines that have operated in Montana and elsewhere for over 30 years. Although the Sheppard report recommends 1 kV/m as a very conservative level, the report also says that the scientific data do not define a single field strength level. The report further says the evidence does not define a level to within small factors such as 2 or 3, that is 1-3 kV/m (p. VII-15). The proposed 1.8 kV/m level is, therefore, well within the range as implied in the Sheppard report as being unlikely to cause adverse effects to persons chronically exposed.

In this context, Dr. Sheppard considers chronic exposure to include persons who may some day build their house right next to the right-of-way. The DNRC report recommends only the 1 kV/m level without acknowledging all the qualifying factors discussed in the Sheppard report. In view of this uncertainty the DNRC report does not address how they distinguish some level of risk to the public between such small edge of right-of-way levels as 1 and 1.8 kV/m.

On this point, the DNRC report appears to be attempting to set a field strength standard based on a very conservative recommendation from one individual, rather than assessing the impacts of the Garrison-Spokane line. The DNRC report identifies only two other prior situations to support their 1 kV/m recommendation. One of these is a paper written 8 years ago that suggests 750-kV lines in the Soviet Union produce 1 kV/m at the right-of-way edge. If the recommendation is being partly justified on Soviet experience, then DNRC should have also acknowledged a 1980 Soviet paper. The more recent paper states that the expected dangerous effects of electric fields were overestimated and that 3 to 5 kV/m is a safe range for the edge of a 750-kV right-of-way. The Sheppard report also pointed out that Soviet regulations allow electrical workers unlimited time in fields less than 5 kV/m.

The only other case discussed in the DNRC report to support the 1 kV/m level, involved a California recommendation. However, the DNRC report does not acknowledge that the California recommendation referred to a 230-kV line. Not mentioned in the DNRC report is the final decision on the 230-kV line, by the California Energy Resources Conservation and Development Commission. The final decision indicated the 1 kV/m recommendation was not warranted. The California Commission concluded that as long as the 230-kV line operated in a manner consistent with similar existing lines, there would be no identifiable threat to human health. The California Energy Commission also recently approved a 500-kV line that would produce 2 kV/m at the edge of the right-of-way.

The DNRC report suggests that edge of right-of-way fields for lines below 345-kV are generally less than 1 kV/m. In Montana alone there are over 1,900 miles of 230-kV lines that operate with edge of right-of-way fields ranging from about 0.6 to 2.4 kV/m. Some of these lines have been operating for around 30 years. There are also 60 miles of 500-kV line in Montana that have operated for 10 years with around 2 kV/m at the edge of right-of-way. The 340 miles of 500-kV lines under construction from Colstrip to Garrison will also operate at around 2 kV/m. Another point not specifically discussed in the DNRC report is that health and safety considerations of 500-kV lines are not unique to Montana. For example, 500-kV lines have been recently considered by State Agencies in Oregon, California, Washington, North Dakota, and South Dakota, where the lines would all operate with edge of right-of-way fields greater than 1 kV/m. The American Electric Power Company operates around 1,500 miles of 765-kV lines in six states with edge of right-of-way fields of around 4 kV/m. There are no national standards for transmission line electric fields. Most states, including Montana, also have not established such standards. Exceptions include: Oregon, 9 kV/m maximum on right-of-way; New Jersey, 3 kV/m edge of right-of-way; and New York, 1-2 kV/m edge of right-of-way, 11.8 kV/m on the right-of-way. Field levels for Garrison-Spokane are, therefore, consistent with these other State standards. Although the DNRC report doesn't mention the Oregon standard, it is important to note that Oregon (and some other State recommendations) specify only maximums on the right-of-way.

The edge of a transmission line right-of-way is not fenced or marked. Without a tape measure a person is able to walk on and off the right-of-way without ever knowing where the edge is located. In forested areas, a cleared area does roughly correspond to the right-of-way. However, trees shield the electric field so if houses or people are beneath or behind the trees, the electric field is near zero.

A final area I would like to comment on is audible noise. Noise is produced by 500-kV lines primarily because of corona on conductors during wet weather. During the 16 years that BPA has operated 500-kV lines, designs were improved to reduce the production of audible noise. The Dietrich report prepared for DNRC confirmed that the proposed BPA line is typical of today's lower noise level designs. The proposed line will produce less noise than most of the 500-kV line that has operated for 10 years in Montana. The Dietrich report also verified that BPA accurately predicted the average noise level that would be produced by the proposed line. Montana has no noise standards related to transmission lines and there are no such national noise regulations. The Dietrich report verified BPA's analysis that the line will not exceed the Federal EPA general noise level recommended to protect health and welfare with an adequate margin of safety (p. 26). However, the report indicates that if one were to modify the BPA level, noise from the line would exceed the EPA recommendation.

The modification would include applying a penalty to corona noise to account for its high frequency content. The Dietrich report, however, does not specifically recommend modifying the EPA level, and cautions that the validity of the study on which the penalty is based is limited because of the small scale of the experiment (p. 14). In addition, the Dietrich report assumes an upper limit for percentage of foul weather occurrence that Dietrich cautions overstates the noise impact of the line. The high estimate was used because Dietrich was not aware of available weather data. Such data, however, are available which show that the precipitation percentage on an hourly basis is about half the high level assumed by the Dietrich and DNRC reports.

The DNRC draft report does not acknowledge the problems and uncertainties associated with modifying the EPA noise level. DNRC recommendation No. 4 calls for a 254 foot wide right-of-way in some areas to meet the modified level. Data on which the modification is based has been available for over 3 years. We are not aware of any previous situation where EPA or any other federal or state agency has modified the EPA noise level just for transmission lines. DNRC should clearly indicate if it is their conclusion that the EPA level should be changed. Even assuming such a modification was justified, the BPA line with a 125 foot wide right-of-way would still exceed the EPA level if more realistic penalty levels (which are cited in the Dietrich report) and realistic precipitation percentages were used.

In summary, the proposed route identified in the final BPA EIS for the Garrison-Spokane line, minimizes impacts on people and it avoids existing residences by approximately 1,000 feet. Electric fields at the edge of the 125 foot right-of-way will be less than for some lower voltage lines that have operated safely for over 30 years. Only by modifying the federal noise guideline, and by assuming other conditions that DNRC's contractor says overstates the impact of the line, can DNRC support recommendation No. 4 which calls for widening the proposed right-of-way. Dietrich stresses that annoyance conditions related to transmission line noise occur only a small percentage of the time and require the simultaneous occurrence of several events, namely foul weather, open windows, and quiet ambient noise within a home that is located near the right-of-way (p. 23). BPA policy is to investigate complaints about line noise and to provide mitigation if a BPA facility is not in compliance with applicable noise regulations. The general language in DNRC construction specification No. 16.9 (p. 96), should be modified to reflect BPA mitigation policy.

This concludes my testimony.
JMLee:mrs:Wg2038E:03-09-83

APPENDIX E

BOARD OF NATURAL RESOURCES AND CONSERVATION
CONSTRUCTION STANDARDS

CONSTRUCTION MONITORING ON THE 500-KV LINE
FROM COLSTRIP TO TOWNSEND

CONSTRUCTION STANDARDS FOR 500-kV
GARRISON TO SPOKANE TRANSMISSION LINE
Amended April 1983

The following general standards are intended to mitigate impacts from construction and operation of transmission lines. The Montana Board of Natural Resources and Conservation adopted similar construction standards for other large transmission lines.

DEFINITIONS

BPA: Bonneville Power Administration
ONRC: Department of Natural Resources and Conservation
DFWP: Department of Fish, Wildlife, and Parks
DSL: Department of State Lands

Contractor: Constructors of the Facility

0.0 GENERAL

Construction of the 500-kV line shall require good construction practices reflecting the landowners' needs, environmental impacts, economics and engineering considerations. These standards for construction shall become part of the Contract with the successful bidder, and shall include the following: (1) general standards for CONTRACTOR performance; (2) planning and coordination; (3) construction camps or facilities (4) public safety and protection of property; (5) access roads and vehicle movement; (6) right-of-way clearing and site preparation; (7) tower design, tower erection, and conductor stringing; (8) timing of construction; (9) fences and cattleguards; (10) grounding; (11) erosion and sediment control; (12) archaeology and history; (13) control of fires; (14) waste disposal; (15) post-construction cleanup and reclamation; and (16) post-construction activity.

The CONTRACTOR shall conduct his operations in a manner to protect the quality of the environment. These standards contain provisions which shall be considered in all the CONTRACTOR's operations.

The CONTRACTOR's specific responsibilities are described below.

1.0 GENERAL STANDARDS FOR CONTRACTOR PERFORMANCE

1.1 The CONTRACTOR shall formally and informally brief all contractor supervisors and employees on environmental constraints prior to and during construction, and shall post such reminders on job sites.

1.2 All activities of the CONTRACTOR shall comply with the Environmental Criteria and Electric Transmission Systems issued by U.S. Departments of the Interior and Agriculture, and with all local, state, and federal environmental and sanitary requirements.

1.3 The DNRC, in its evaluation of the centerline, will designate certain areas along the right-of-way or access roads as Environmentally Sensitive. These areas will be identified before construction begins. Their location will be described in a letter attached to these STANDARDS. These areas may include, but are not limited to, scenic, historical, and archaeological areas, fish and wildlife habitats, watersheds, public recreational areas, and unique ecosystems or areas such as old-growth forests. Special precautions or methods shall be taken in these areas during construction, as described elsewhere in these standards or in the letter attached to them. The BPA shall notify the CONTRACTOR to take all necessary actions to avoid adverse impacts to these environmentally sensitive areas.

2.0 PLANNING AND COORDINATION

Prior planning of all stages of construction and maintenance activities is essential to ensure that construction-related impacts will be minimized. It also provides the only means by which the line can adequately be evaluated and further mitigation suggested. It forces the CONTRACTOR to plan in advance the use of roads, timing of construction, and other details, and allows combination of roads and spacial use sites where possible. Prior planning by the CONTRACTOR shall include, but is not necessarily limited to, the following:

2.1 Maintenance routes to all points on the line should be planned before construction ends.

2.2 All excavations for sand, gravel, clay, borrow or riprap materials may be subject to either the Open Cut Mining Act or Hard Rock Mining Act, and the CONTRACTOR shall apply for necessary permits at least sixty days in advance.

2.3 At least 30 days prior to beginning construction of the line, BPA's field representative or the CONTRACTOR shall meet with local officials and service providers in each affected community to advise these persons of the temporary increase in population, when the increase is expected, and where the workers will be reporting in or stationed. Maps of the line and access roads must be available so that service providers can determine where and when any problems could arise. Service providers contacted shall include, as a minimum, the county commissioners, city commissions or councils, law enforcement officials, fire departments, emergency service providers, school officials, motel or other transient lodging operators, and a representative of the Chamber of Commerce.

If problems relating to inadequate housing, schools, or other facilities are identified, this information can be provided by the CONTRACTOR to immigrant workers, advising them to locate where there are adequate facilities. Arrangements can be made for emergency or other services that might be needed during construction. If trespass problems on new access roads are foreseen as a problem, the need for gates or other solutions can be determined. If road or bridge upgrading, maintenance, or signing for safety are identified as needs, plans can be made to meet them.

3.0 CONSTRUCTION FACILITIES

3.1 The preservation of the landscape and environment shall be a primary consideration in the location of temporary construction camps, storage areas, and building required in the performance of the work.

3.2 Construction sites and staging areas shall be kept as small as possible and shall be located where most environmentally compatible, such as in areas having the flattest available slope and lacking fragile soil or vegetation types. Full restoration and reshaping of these areas including seeding and mulching shall be made following Section 15 of the Guidelines — "Post-Construction Cleanup and Reclamation."

3.3 All work areas shall be maintained in a neat, clean, and sanitary condition at all times.

4.0 PUBLIC SAFETY AND PROTECTION OF PROPERTY

4.1 Construction operations shall not close or obstruct any portion of any railroad, public road, public trail, or other property until the necessary permits have been obtained from the authorities having jurisdiction.

4.2 Environmentally Sensitive areas which have been identified, and all cultivated and planted areas and vegetation such as trees, plants, shrubs, and grass on or adjacent to the right-of-way which do not interfere with the performance of work, shall be preserved.

4.3 Reasonable precautions shall be taken to protect, in place, all public land monuments and private property corners or boundary markers. If any such land markers or monuments are destroyed, they shall be reestablished and referenced in accordance with the procedures outlined in the "Manual of Instruction for the Survey of the Public Land of the United States" or, in the case of private property, the specifications of the county engineer.

4.4 Firearms carried in any vehicle or by personnel involved in this project while he/she is on or in the vicinity of the project right-of-way should be discouraged. Violators of any state, federal, or international law protecting wildlife shall be referred to the proper authorities. Any employee illegally taking wildlife shall be immediately dismissed.

4.5 Guard structures shall be installed over all existing transmission lines, distribution lines, telephone lines, and public roads that will be crossed by the conductors.

4.6 Care shall be taken to ensure that all gates are reclosed after entry or exit and that landowners incur no losses due to negligence on the part of the CONTRACTOR or his employees. Gates shall be inspected and repaired and missing padlocks shall be replaced when requested by landowner.

4.7 Public travel through and use of active construction areas shall be discouraged.

4.8 BPA's right-of-way shall be expanded to avoid existing residences by a margin of 75 feet on either side of BPA's proposed 125 foot right-of-way.

4.9 The requirements of the Historic Preservation Act must be met, including adherence to the recommendations of the Council on Historic Preservation.

5.0 ACCESS ROADS AND VEHICLE MOVEMENT

5.1 Construction of new roads shall be held to the absolute minimum reasonably required to construct the facility. State, county, and other existing roads shall be used for construction access wherever possible. Where new roads must be built for construction access, they shall also serve permanent maintenance access requirements. Roads intended to be used as permanent maintenance roads should be initially designed as such. The location of access roads and towers shall be established in cooperation with affected landowners and landowner concerns shall be accommodated wherever reasonably possible.

5.2 All new roads both temporary and permanent shall be constructed with the minimum possible clearing and soil disturbance to minimize erosion, as specified in Section II of these standards, entitled "Erosion and Sediment Control."

5.3 All roads shall be initially designed to accommodate the largest piece of equipment that will eventually be required to use them; road width shall be no wider than necessary.

5.4 During construction, unauthorized cross-country travel and the development of roads other than those approved shall be strictly prohibited. The CONTRACTOR shall be liable for any damage, destruction, or disruption of private property and land caused by his construction personnel and equipment as a result of unauthorized cross-country travel and road development.

5.5 Roads shall be located near the center of the right-of-way insofar as possible, enabling traffic to avoid cables and conductors during the wire-stringing operation. Necessary crossing of the right-of-way centerline should be near towers for the same reason.

5.6 Where practical, temporary roads shall be constructed on the levelest land available. Where roads cross flat land they shall not be graded or bladed unless necessary, but will be flagged to show their location and to prevent travel off the roadway.

5.7 Construction activities and travel shall be conducted to minimize dust. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used. Oil or similar petroleum-derivatives shall not be used.

6.D RIGHT-OF-WAY CLEARING AND SITE PREPARATION

6.1 Clearing of survey lines shall be done using hand methods or small power tools only. During clearing of the right-of-way, shrubs shall be preserved to the greatest extent possible. Where shrub removal is necessary, brush blades and not dirt blades shall be used to minimize disturbance to roots.

6.2 Right-of-way clearing shall be kept to the minimum necessary to allow construction access and to ensure that the line will not be damaged by falling trees. In no case should the entire nominal width of the right-of-way be cleared right up to the edge; clearing should instead produce a "feathered edge" right-of-way configuration, where only specified hazard trees and those that interfere with construction or conductor clearance are removed. Smaller trees

should be allowed to grow on the right-of-way and beneath the conductors. Where possible, small trees and brush cut during construction should be chipped and scattered, and merchantable timber should be sold.

6.3 Scalping of the earth or any unnecessary disturbances shall not be allowed on any clearing, except in rocky areas, or on slopes where cuts and fills are necessary.

6.4 No timber shall be cut or destroyed outside the right-of-way without first obtaining permission from the appropriate landowner. The CONTRACTOR shall be held liable for any unauthorized cutting, injury or destruction to timber whether such timber is on or off the right-of-way. The extent of such liability shall be to reimburse the landowner for such timber at the current market value.

6.5 Felling shall be directional in order to minimize damage to remaining trees. Maximum stump height shall be 6 inches on the uphill side or 1/3 the tree diameter, whichever is greater. Trees will not be pushed or pulled over. Stumps need not be removed unless they conflict with a structure or anchor.

6.6 Special logging techniques, hand clearing, or hand excavation may be required in certain highly sensitive or fragile areas (such as streams, scenic areas, highway crossings, and historical sites), as determined on a site-by-site basis.

6.7 Wherever appropriate, selective clearing shall be used to make curved, wavy, or irregular boundaries along the right-of-way limits. Where there is potential for long tunnel views of transmission lines or access roads, and where appropriate, special care shall be taken to screen the lines from view. This can be done by judicious use of screen planting. Where appropriate, special care shall be taken to leave a separating screen of vegetation where the right-of-way and highways and rivers are parallel (see USDI and USDA, "Environmental Criteria for Electric Transmission Systems").

6.8 All earth-moving equipment shall be operated only by qualified, experienced personnel.

6.9 The CONTRACTOR's general foreman shall make sure that crane landings are constructed in accordance with accepted construction practices, and that only one crane landing is constructed per tower site. Construction of crane landings on level ground is not necessary and shall not be allowed except for extreme conditions (such as soft or marshy ground).

6.10 No motorized travel on, scarification of, or displacement to stabilized talus slopes shall be allowed except where absolutely necessary.

6.11 The CONTRACTOR shall take reasonable measures to avoid the creation of noise levels that are safety or health hazards.

6.12 The CONTRACTOR shall take all necessary actions to avoid adverse impacts of sensitive areas which may include, but are not limited to, scenic, historical and archaeological areas, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments.

7.0 TOWER DESIGN, TOWER ERECTION, AND CONDUCTOR STRINGING

7.1 It is desired that socklines shall be strung on foot or using helicopters. Use of motorized vehicles to string socklines shall be done only where terrain warrants, or from existing access roads and when it will not be environmentally damaging.

7.2 At certain wetlands heavily used by migratory birds, certain measures may be required to reduce the incidence of wire strikes. These changes may include but are not necessarily limited to use of self-supporting rather than guyed towers, local habitat modification, or installation of devices such as flags or marker balls on static wires.

8.0 TIMING OF CONSTRUCTION

8.1 Construction and motorized travel may be restricted or prohibited at certain times of the year at critical sites which differ seasonally in sensitivity to construction-related disturbances. They includes sites:

- a. in the vicinity of heavily used recreation sites on weekends or holidays;
- b. on or near winter ranges or other areas important to moose, elk, deer, antelope, mountain sheep, and mountain goats during the appropriate months;
- c. in or near streams during seasons of migratory fish spawning.

9.0 FENCES AND CATTLEGUARDS

9.1 All fences crossed by permanent access roads shall be provided with a gate not less than 16 feet wide. All fences crossed by access roads shall be "H" braced, before the fence is cut. Fences not to be gated should be restrung temporarily during construction and permanently after construction is complete.

9.2 Cattleguards, when required, shall be aligned at right angles with the roadway and shall be accompanied by an off-road gate wide enough for all construction equipment.

9.3 The CONTRACTOR shall immediately replace all fencing and gates that are cut, removed, damaged, or destroyed by him with new materials to the original standard, except that undamaged gates may be reused.

9.4 BPA will work with affected landowners in placing fences, gates or cattleguards to improve access or to prevent trespass.

10.0 GROUNDOING

10.1 Barbed wire and woven wire fences on the right-of-way shall be grounded. At a minimum, fences which cross the right-of-way shall be grounded on each side of the gate opening and at each edge of the right-of-way. Fences which run on the right-of-way parallel to the centerline shall be grounded at least every 200 feet.

10.2 All metallic objects other than fences which are on the right-of-way, such as buildings with metallic roofs or sides and metallic piping systems installed above ground, shall be adequately grounded.

10.3 Generally, metallic objects off the right-of-way shall not require grounding; however, each metallic installation insulated from ground shall be reviewed on an individual basis to see if grounding is needed.

11.0 EROSION AND SEDIMENT CONTROL

11.1 Clearing and grubbing for roads and rights-of-way and excavations for stream crossings shall be carefully controlled to minimize silt or other water pollution downstream from the rights-of-way. Sediment retention basins may be required if silting occurs.

11.2 Roads shall cross drainage bottoms at sharp or nearly right angles and level with the streambed whenever possible.

11.3 Under no circumstances shall streambed materials be removed for use as backfill, embankments, road surfacing, or for other construction purposes. No excavations shall be allowed on any river or live stream channels or floodways at locations likely to cause detrimental erosion or offer a new channel to the river or stream at times of flooding. Culvert installation will be done using normal construction procedures following on-site inspections by DNRC and MDFWP.

11.4 No blasting shall be allowed in streams. Blasting may be allowed near streams if precautions are taken to adequately protect the stream from debris.

11.5 The CONTRACTOR shall maintain roads while using them. All ruts made by machinery shall be filled to prevent channeling. In addition, the CONTRACTOR must take measures to prevent the occurrence of erosion caused by wind or water during and after use of these roads. Some erosion-preventive measures include but are not limited to installing or using cross logs, drain ditches, water bars, and wind erosion inhibitors such as water, straw, gravel, or combinations of these items.

11.6 The CONTRACTOR is required to prevent material from being deposited in any watercourse or stream channel. Where necessary, measures such as hauling of fill material, construction of temporary berriers, or other approved methods shall be used to keep slash, excavated materials, and other extraneous materials out of watercourses. Any escaped fill, slash, etc., shall be removed immediately from watercourses.

11.7 Where required, coarse rock encountered in the excavation shall be used as far as practicable for constructing the sides of new embankments adjacent or parallel with any affected stream where such material may serve as protection against slope or channel erosion. The CONTRACTOR shall be responsible for the stability of all embankments made under the contract until final acceptance of the work. Embankments and backfills shall contain no muck, frozen material, large roots, sod, or other deleterious matter. The CONTRACTOR shall prevent the escape of fill material by the construction of toe ditches or by the erection of rock, boulder, earth, or log berriers at the toes of embankments, or by other suitable methods.

11.8 Culverts or arch bridges shall be installed at all crossings of flowing or dry watercourses where fill is likely to wash out during the life of the road. Culvert or bridge installation is prohibited in areas of important fish spawning beds and during specified fish spawning seasons on less sensitive streams or

rivers. Culverts shall be of sufficient size to handle approximately 15-year floods. Culvert size shall be determined by standard procedures which take into account the variations in vegetation and climatic zones in Montana, the amount of fill, and the drainage area above the crossing. Water velocities or positioning of culverts shall not be such that fish passage is impaired.

11.9 No fill material other than that necessary for road construction shall be piled within the high water zone of streams where floods can transport it directly into the stream. Excess floatable debris shall be removed from areas immediately above crossings to prevent obstruction of culverts or bridges during periods of high water.

11.10 No skidding of logs or driving of vehicles across a perennial watercourse shall be allowed, except via authorized construction roads. No perennial watercourses shall be blocked or diverted.

11.11 Construction activities shall use methods that will prevent accidental spillage of solid matter, contaminants, debris, petroleum products, and other objectionable pollutants and wastes into watercourses, lakes, and underground water sources. Catchment basins shall be installed at storage areas to contain accidental spills of fuel, chemicals, oil, etc.

11.12 When operations in a work area are complete, all temporary structures or fills installed to aid stream crossing shall be removed and the thread of the stream reestablished to prevent future erosion.

11.13 All temporary dams built on the right-of-way shall be removed within five years of their construction or be upgraded to permanent structures with either spillways or culverts, and a continuous sod cover on their tops and downstream slopes. Spillways may be protected against erosion with riprap or equivalent means.

12.00 ARCHAEOLOGY AND HISTORY

12.1 BPA shall engage a competent archaeologist familiar with the area to designate areas likely to be of archaeological and historical significance, and to design an appropriate field survey. Such field work and appropriate mitigating measures shall be completed for any finds prior to the start of construction.

12.2 If any artifacts or items of apparent archaeological or historic significance are discovered before or during construction, care shall be taken not to disturb the artifacts or surrounding area, and the archaeologist shall be notified immediately.

12.3 Any relics, artifacts, fossils or other items of historical or archaeological value shall be preserved in a manner agreeable to both the landowner and the State Historic Preservation Officer.

12.4 To reduce impacts on cultural resources, DNRC recommends a new section 12.4 be added to the Board's construction standards stating that BPA actions shall conform to recommended treatments for cultural resources from either the Montana State Historic Preservation Office (SHPO) or the Advisory Council on Historic Preservation (AChP), whichever takes legal precedence as defined by the Memorandum of Agreement for the project signed by BPA, SHPO and AChP.

13.0 CONTROL OF FIRES

13.1 A fire plan shall be proposed that sets forth in detail the plan for prevention, control and extinguishing of fires on and near the project area.

13.2 The CONTRACTOR shall comply with any county, town, state or governing municipality having jurisdiction regarding fire laws and regulations.

13.3 Blasting caps and powder shall be stored only in approved areas and containers and always separate from each other.

13.4 The CONTRACTOR shall provide necessary equipment for fire prevention and suppression. Spark arresters and additional mufflers on some engines may be required in areas of high fire danger.

13.5 The CONTRACTOR shall properly store and handle combustible material which could create objectionable smoke, odors, or fumes. The CONTRACTOR shall not burn refuse such as trash, rags, tires, plastics, or other debris, except as may be permitted by the county, town, state, or governing municipality having jurisdiction.

14.0 WASTE DISPOSAL

14.1 General cleanup of the right-of-way and access roads shall be done by the CONTRACTOR for the duration of the project.

14.2 Disposal of any materials, waste, effluents, trash, garbage, oil, grease, chemicals, etc., shall be subject to the approval of the landowner.

14.2 BPA must use licensed solid waste disposal sites for disposal of its wastes. Inert materials (Group III wastes) may be disposed of at Class III landfill sites; mixed refuse (Group II wastes) must be disposed of at Class II landfill sites.

14.3 All used oil or other petroleum products shall be hauled away. There shall be no release of crankcase oil or other toxic substances into streams or the soil.

14.3 Emptied pesticide containers or other chemical containers must be triple rinsed to render them acceptable for disposal in Class II landfills or for scrap recycling pursuant to ARM 16.44.202(12) for treatment or disposal.

14.4 All used oil shall be hauled away and recycled or disposed of in accordance with 14.2 through 14.4 above. There shall be no release of crankcase oil or other toxic substances into streams or soil.

14.5 All waste materials resulting from the construction and operation of the BPA transmission line project for either the primary location or alternate locations which constitute a hazardous waste defined in ARM 16.44.303, and wastes containing any concentration of polychlorinated biphenyls must be transported to an approved designated hazardous waste management facility (as defined in ARM 16.44.202(12) for treatment or disposal).

14.6 All non-combustible wastes such as conductor, ceramic or metal scrap shall be hauled away or buried. Permission shall be obtained from the landowner before burial of these wastes.

14.6 Sanitary waste shall not be discharged into streams or any streambeds. The CONTRACTOR shall provide refuse containers and sanitary chemical toilets, convenient to all principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations.

14.7 Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete lift cleanup, and other waste water processes shall not be discharged into surface waters.

14.8 Complete disposal of all slash made by the project shall be required pursuant to 76-13-401 through 76-13-413 MCA. Some slash may be used in constructing barriers to inhibit travel on closed roads along the right-of-way.

14.9 Combustible wastes such as packaging material shall be hauled away and disposed of upon leaving any work area.

14.9 Generally, combustible wastes shall not be burned. In instances where disposal by burning seems preferable, it shall require the prior approval of the landowner, and shall be done with small fires only to dispose of construction waste. A Montana Open Burning Permit Must be Obtained.

14.10 BPA must dispose of pesticide residue and pesticide containers in accordance with ARM 16.20.633(9).

15.0 POST-CONSTRUCTION CLEANUP AND RECLAMATION

15.1 Subject to maintaining the integrity of the tower foundation and anchors, all signs of temporary construction facilities such as haul roads, work areas, buildings, foundations or temporary structures, stockpiles or excess or waste materials, or any other vestiges of construction shall be removed and the areas restored to as natural a condition as is practical, in cooperation with the landowner.

15.2 Grading and scarifying of all temporary roadways shall be required to restore the area to near natural conditions that will permit the growth of vegetation and discourage future traffic.

15.3 Any landscape feature scarred or damaged by equipment or operations shall be restored as nearly as practical to its original condition. Bare areas created by construction activities will be reseeded to prevent soil erosion.

15.4 In cooperation with the landowner, closure of temporary roads shall be done by installing signs, constructing rock barriers, soil berms, planting trees, or other approved means after completion of scarifying, water-barring and revegetation in these areas.

15.5 Replacement of earth adjacent to excess roads crossing streams shall be at slopes less than the normal angle of repose for the soil type involved.

15.6 Disturbance of drainage bottoms shall be minimal, and all drainage bottoms shall be restored to their preconstruction gradient and width to prevent accelerated gully erosion.

15.7 Cross drains and water bars shall be added at an angle and as frequently as appropriate to satisfy road grades.

15.8 Interrupted drainage systems shall be restored for all cleared cantarlines.

15.9 Seeding prescriptions to be used in revegetation shall be jointly determined by representatives of BPA, DNRC, DSL, and other involved state and federal agencies.

15.10 All litter resulting from construction is to be removed from the right-of-way and along access roads leading to the right-of-way within 30 days of completion of wire stringing and splicing. If requested by the landowner, BPA shall provide for removal of any additional debris after this initial cleanup.

15.11 Any existing waste material moved or disturbed shall be placed on the right-of-way so that it does not form fire hazards or stock barriers, and not block access to the right-of-way or to structure sites. Waste material includes disposable material such as tops, limbs, brush, uprooted stumps, unmerchantable logs, buildings designated for disposal, building debris, and other disposable debris. The degree of disposal to be performed is dependent on the existing land use. Occasional tops, limbs, and brush to 3 inches in diameter and to 3 feet in length may be left on other than cropland and residential land.

15.12 Piling and windrowing of material for burning shall be by tractor equipped with a forked clearing blade except where equipment is prohibited. In areas where such equipment is prohibited, methods that will prevent soil from being included in the material to be burned shall be used to minimize destruction of ground cover, and to minimize erosion. Piles shall be relatively small and compact so as to minimize danger to timber and damage to ground cover.

15.13 BPA is responsible for correcting cultivated land compacted by equipment and other land as requested by the landowner or managing agency.

15.14 If difficulties in revegetation are anticipated, stockpiling of topsoil to be spread on road cuts prior to reseeding is encouraged.

15.15 Sufficient seeds and fertilizer, of specific percentage purity, germination, and inert material, shall be ordered early enough to ensure reseeding during the first agricultural planting season after construction ends for each segment of the line.

15.16 Where appropriate, hydroseeding or drilling and seeding shall be used to aid revegetation. Mulching with straw or wood chips shall be used where necessary.

15.17 Revegetation shall not be considered complete until the following criteria are met:

- a. In rangeland, coverage of perennial species shall be 30% or more of that on adjacent rangeland the year following revegetation, and 90% or more of the coverage of adjacent rangeland within the five years following revegetation.

b. In forest land, revegetated land exclusive of the right-of-way or permanent roads shall be stocked with trees by the end of five years so that the approximate stocking level of adjacent forest, or canopy closure, whichever is less, will be attained at maturity.

16.0 POST-CONSTRUCTION

As follow-up after construction, the following shall be done, in cooperation with the landowner:

16.1 Vegetation, particularly that of value to fish and wildlife, which has been saved through the construction process and which does not pose a hazard to the powerline, shall be allowed to grow on the right-of-way.

16.2 Appropriate vegetation cover shall be maintained in the areas immediately adjacent to transmission towers.

16.3 Environmentally sensitive areas identified during centerline study shall be preserved and included in the right-of-way management plan.

16.4 If and where permitted, access roads and service roads shall be maintained with grass cover, water bars, cross drains, and the proper slope in order to prevent soil erosion.

16.5 Maintenance inspections shall be timed so that routine maintenance will be done when access roads are firm, dry or frozen, wherever possible. Maintenance vegetative clearing in environmentally sensitive areas identified during centerline study shall be done according to criteria spelled out in the ROW management plan.

16.6 Aircraft shall normally be used to inspect the powerline. Aerial inspection and ground maintenance activities of the powerline shall include observations of soil erosion problems, and conditions of the vegetation on the right-of-way or access roads that require attention. Appropriate corrective action will be taken where necessary.

16.7 BPA shall advise all beekeepers along the proposed final route of the known effects of electrical fields on bees and of the uncertainties involved. If necessary, BPA shall assist the beekeepers in relocating hives prior to energizing the transmission line.

16.8 When radio and TV interference problems occur as a result of the construction or operation of the transmission line, BPA should resolve the problems by appropriate methods, including mechanical corrections to insulators and antennas, and installation of remote antennas or of repeater stations.

16.9 If noise problems occur as a result of construction or operation of the transmission line, BPA should resolve them by reconductoring or purchase of property, where appropriate.

17.0 USE OF PESTICIDES RESTRICTED

The following restrictions apply to the use of pesticides as defined in ARM 16.20.603(13):

17.1 Any application of pesticides used in the right-of-way of BPA's transmission line corridor will be done in accordance with section 7-22-2101(3), MCA, and with regulations of the Montana Department of Agriculture.

17.2 Proper herbicide application methods will be used to keep drift and non-target damage to a minimum.

17.3 Pesticides must be applied according to label specifications and in accordance with 17.1 above. Only pesticides registered in compliance with applicable federal and state laws may be applied.

17.4 Pesticides shall not be sprayed during heavy rains or threat of heavy rains. Vegetative buffer zones shall be left along all identifiable stream channels. Pesticides shall not be used in any public water supply watershed identified by the Department of Health and Environmental Sciences.

17.5 BPA will cooperate with landowners in control of noxious weeds.

17.6 BPA shall notify DNRC, DFWP, and the Montana Department of Agriculture in writing 30 days prior to any broadcast or aerial spraying of pesticides. The notice shall provide details as to the time, place, and justification for such spraying. The state agencies shall have the opportunity to inspect the portion of the ROW or access roads scheduled for such treatment before, during, and after spraying.

CONSTRUCTION MONITORING

DNRC follows Board standards in monitoring construction of facilities to ensure that reclamation and revegetation are successful. Problem areas identified during centerline studies are visited several times during construction. Other areas are checked on as needed to determine compliance with construction guidelines.

DNRC monitored construction of the Colstrip 500-kV Lines from Colstrip to Townsend and, to a lesser extent, from Townsend to Garrison. This monitoring indicated that differences in construction practices and right-of-way negotiations may be contributing to higher landowner impact on the Townsend to Garrison portion of the line. The differences are described below and a monitoring program for the Garrison-West 500-kV line is recommended.

Construction From Colstrip to Townsend

Between Colstrip and Townsend, the powerline crosses mostly private land, with a few scattered tracts of BLM and state land, and some National Forest land crossed near Lennep and in the Big Belt Mountains. Twin single-circuit towers averaging 130 feet high are used for the line between Colstrip and Townsend. Relatively lightweight, guyed towers predominate in flat terrain. An independent right-of-way agent negotiated easements and monitored construction for the Colstrip 500-kV lines east of Townsend. This agent was responsible for obtaining right-of-way, dealing with landowner problems during construction, correcting problems to the satisfaction of landowners, and obtaining releases after construction. The agent was aware of special stipulations on each piece of land, and worked to keep agreements with landowners and prevent damage to their property.

DNRC's field inspections have confirmed that landowner relations procedures used on the segment east of Townsend were effective in reducing construction impacts.

Construction From Townsend to Garrison

This section of line crosses some rugged mountainous terrain in the southern Elkhorn Mountains and between Boulder Pass and the Deer Lodge valley. It also crosses some gently rolling terrain in the Missouri River, Boulder, and Deer Lodge valleys. Double-circuit towers averaging about 175 feet in height are used throughout this segment. A detailed monitoring study, was not performed on the Townsend to Garrison portion although field inspections were made during construction. DNRC also conducted a telephone survey. The Board's construction standards were included in contract agreements on this portion of the line but DNRC did not monitor for compliance with the standards.

Although BPA normally uses its own staff to acquire easements, a private right-of-way agent was used on this portion because of time constraints. A single project engineer was responsible for overseeing construction contracts. Although landowners were given a toll-free number to report problems, there was no person responsible for handling them.

Permanent access road grades built to each tower will remain. Increased erosion will cause long-term impact from access roads on this portion, primarily due to the steep terrain.

Problems on the Townsend to Garrison Segment.

Landowner Problems. DNRC's telephone survey of landowners along the route indicated that easement negotiations with landowners were sometimes not concluded, which caused landowner concern about whether they would receive fair compensation. Cattle ranchers had the most serious complaints about the abuse of easement privileges including gates left open, delays in the replacement of cattle guards, cuts through fences that were not cross-braced, causing them to fall, and equipment operating outside access road and right-of-way boundaries. Landowners had difficulty getting problems corrected because BPA did not designate a local representative to handle complaints.

Comet

An access road was built through the center of the ghost town of Comet, impairing its eligibility for listing on the National Register of Historic Places. A Memorandum of Agreement signed by the State Historic Preservation Office, BPA, and Advisory Council on Historic Preservation specified that Comet would be avoided. Nevertheless, a BPA contractor built the road with agreement from the landowner. BPA and SHPO are discussing relocating the road and reseeding the unauthorized road. This demonstrates the need for a monitoring program.

Information on structural damage to properties in the townsite remains to be verified through a review of photographic documentation, cadastral records, and further field-checking. A federally-sponsored cultural resource monitoring program was implemented in certain portions of the powerline project, but it proved to be inadequate in the case of Comet where no road-building was scheduled to occur. The landowner has expressed a desire to leave the road in place.

Ohio Mines

In spite of concern expressed by DNRC, a tower was placed directly in view of the historic ruins of the Ohio Mines near Radensburg, and the mine buildings have suffered from construction worker vandalism. The Ohio Mines and other resources in the immediate vicinity were omitted from the inventory of historical and archaeological resources because these properties were considered to be outside the scope of the survey and therefore not within the zone of environmental impact. In general, a 125-ft-wide survey corridor was examined for historical and archaeological resources. Historic properties outside the right-of-way that could be subject to vandalism were to also have been inventoried, but sites beyond 300 ft from the edge of rights-of-way were not considered to be within the area of potential environmental impact (BPA 1982). The problems might have been avoided had DNRC been involved in the centerline selection process and in the monitoring of construction.

Construction from Garrison West.

Adverse impacts along the proposed route could be severe. Topography and sensitive ecosystems along this route could best be protected through careful placement of towers and access roads and monitoring during construction. DNRC and BPA have signed a Memorandum of Agreement that provides for state involvement in centerline selection and construction monitoring. Currently state and federal agencies are evaluating centerline data along the Taft route. In many areas these data are incomplete and further study is needed (see Update, access roads).





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